VOL. XV. No. 1. JANUARY 1930.

MECCANO MAGAZINE

GIANT CRANES TO EQUIP WARSHIPS (see page 2)

6D.

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BEST WISHES FOR 1930 TO ALL READERS OF THE "M.M."—AND TO THEIR PARENTS!

MECCANO MAGAZINE

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Vol. XV. No. 1
January, 1930

With the Editor

Amazing Speed Records of 1929

To-day is the first day of a New Year and I take this opportunity of sending my best wishes for 1930 to you all.

The year 1929 has passed so quickly that I can scarcely believe that it really is at an end. One reason for this is that the year has been full of interesting and important events, which have crowded upon each other very quickly, and more particularly in the course of the later months.

Of all 1929 events, those in which speed records in the air and on land were gained for Great Britain probably caused the greatest satisfaction to the majority of my readers. In this connection Sir Henry Segrave, whose name has been associated for several years with record-breaking feats of this kind, scored a triumph that was British throughout. His wonderful "*Golden Arrow*" was built in this country from the designs of a British engineer; it was fitted with a British engine; and in the hands of its British driver the previous record was broken by 24 m.p.h.

This achievement was followed in September by an equally emphatic victory in the Schneider Trophy Contest. The winner of this historic event, Flying-Officer H. R. D. Waghorn, put up an average speed of 328.63 m.p.h., his fastest lap being 331.26 m.p.h. Even these figures were exceeded a few days later by Flt. Lt. Stainforth and Sq. Ldr. Orlebar, who set out to beat the existing record over a straight course 3 km. in length, which had been held since the autumn of 1927 by the Italian, Major Bernardi. To-day the credit of having flown at the highest speed ever known belongs to Squadron Leader Orlebar, whose Supermarine Rolls-Royce S.6 flashed through the air at the amazing rate of 357.7 m.p.h. This achievement was as great a triumph as that of Sir Henry Segrave, for the new record was practically 40 m.p.h. greater than that of the Italian airman.

To complete the story of British victories in speed events all that was necessary was that the motor boat record also should be captured. Sir Henry Segrave attempted to perform this feat, and at the helm of his famous speed boat, "*Miss England*," he narrowly missed the distinction. His highest speed over a measured course at the Lido was 92.8 m.p.h., which was within a third of a mile per hour of the speed that stands to the credit of the American, Gar Wood, and is the official world's record.

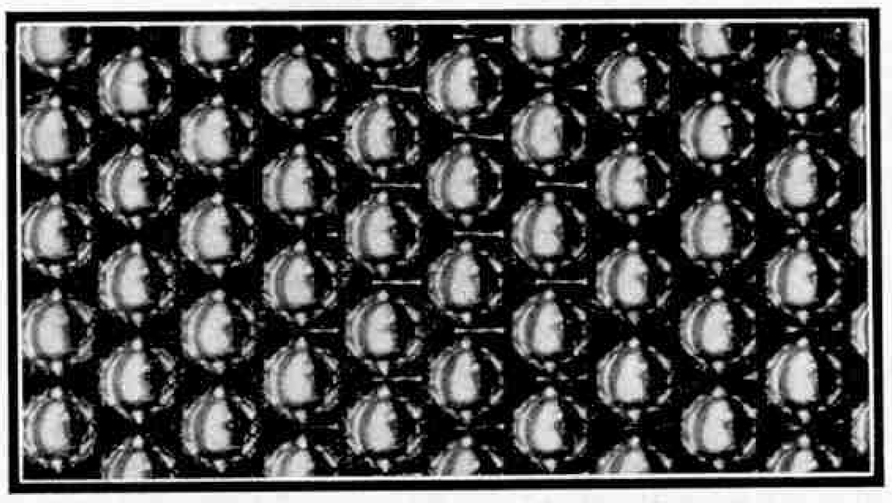
Segrave to Attack another Record

It is gratifying to learn that Sir Henry is to make another attempt on this record. He has been offered the use of the wonderful Schneider Trophy engines designed by the engineers of Rolls-Royce Ltd., and with new boats to which these are fitted he will challenge the present holder of the title in his own country. No doubt the challenge will be stoutly resisted, but if Sir Henry's performance is better than that of Gar Wood, he will bring back to this country the British International Boat Trophy, which has not been in British possession since 1920, in spite of the fact that nearly £250,000 has been spent in efforts to regain it.

One event of the past year that has caused a considerable amount of regret is the loss of what is usually called the "*Blue Riband*" of the Atlantic. For no less than 22 years the Cunard liner "*Mauretania*" has held the proud distinction of being the fastest of the ocean greyhounds on the trans-Atlantic service. This honour has now passed to a German vessel, for on her first voyage the newly-built "*Bremen*" beat the "*Mauretania's*" previous best by nearly 9 hours. The gallant old Cunarder did not give way to her newer rival without making a wonderful effort, and in the early days of last August she failed by less than 4 hours to equal the "*Bremen's*" time in a memorable voyage during which she was called upon to face unfavourable conditions.

The "*Mauretania*" has been in regular service for 22 years, during which her supremacy was practically unchallenged. It is scarcely likely that in 22 years from now the "*Bremen*" will be making efforts to resist the attack on her record by more up-to-date vessels. In fact, it is more probable that she will only hold the coveted distinction until the completion of vessels now planned or under construction. The "*Bremen's*" victory marks the end of the first round in a great battle for supremacy on the ocean, and there is little doubt that very soon the German vessel will be called upon to face much stronger opposition than that offered by the veteran Cunarder.

No. 14. WHAT EVER IS IT?



Here is the fourteenth puzzle in our popular series of mystery photographs—and I am prepared to admit it is a real "teaser." But if we have all the difficult ones early in the year, our task will be all the easier during the hot days of summer!

To the first reader who identifies this mysterious-looking object, or to the reader who gets nearest, I will send an autographed copy of my new book "Wonders of Engineering."

Solutions should be written on postcards only and addressed "Editorial Competition No. 14," Meccano Magazine, Old Swan, Liverpool. Post your entries to reach me before 31st January next.

For result of December, 1929, Competition see page 17.

World's Largest Airship now British

Turning back to achievements in the air, we may derive some consolation for the lost record of the "*Mauretania*" from the fact that Great Britain now possesses the largest and most powerful airship afloat. Until recent years Germany has been regarded as the home of the rigid airship, but to-day the largest airships in the world are the British vessels "*R.100*" and "*R.101*," each of which has a capacity of 5,000,000 cu. ft.

In spite of their size, the two vessels are regarded as experimental, and plans are being made for the construction of others that will have twice their capacity. Before they can be completed, however, the credit of having built the largest airships will pass to the United States, where two vessels having capacities of 7,500,000 cu. ft. are being built. The envelopes of these will be filled with helium, a gas of which at present America practically has a monopoly.

There are many experts who seriously doubt the capabilities of airships, and unfortunately they are able to point to many disasters that support their case. It must be admitted that as yet we know comparatively little about travelling in the air, but knowledge and greater safety will come with experience.

Giant Hammerhead Crane in American Navy Yard

Loads of 350 Tons Handled With Ease

THE ever-growing size and weight of the component parts of modern ships has resulted in a corresponding growth in the size and power of the dockside cranes that handle these components. One of the most interesting of these modern giant cranes is the 350-ton electrically-operated hammerhead crane at the League Island Navy Yard, Philadelphia, U.S.A. In an earlier issue of the "*M.M.*" we gave a brief description of this crane, but it is of such engineering importance that further details will be of value.

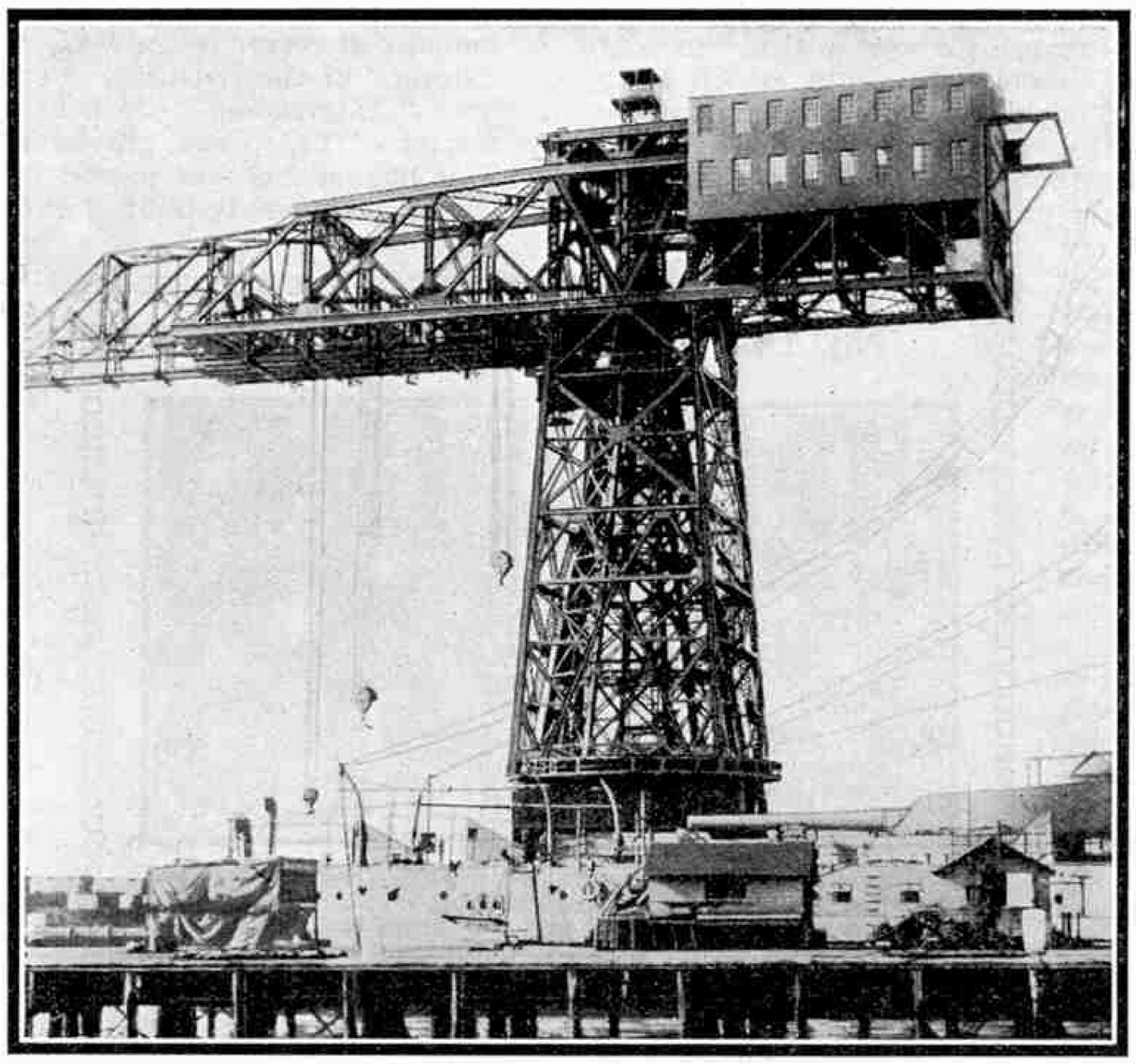
The crane is situated on the 1,000-ft. fitting-out pier in the yard. Some idea of its size may be obtained from the fact that a 10-storey building could be placed under the jib of the crane, and that its overall height is more than 245 ft., or about that of a 17 or 18 storey building. It has been constructed for the purpose of placing the heavier parts such as turrets, ordnance armour plates, boilers, machinery, etc., on the big ships to be constructed at the yard, as well as handling heavy parts in connection with repairs to ships.

Tests of the crane, in the course of which it was loaded to 25 per cent. in excess of its rated capacity, were successfully carried out, the largest single load in these tests being 980,000 lb. In the most spectacular of these tests the crane lifted a total load of 1,010,000 lb., made up of a locomotive weighing 100,000 lb. on the auxiliary (50-ton) hoist; a load of steel billets weighing 416,000 lb. on each of the main (175-ton) hoists; and a locomotive weighing 78,000 lb. on the machinery-house crane.

The location of the crane at the waists of the ships berthed on either side of the pier permits the placing of most of the heavy weights without moving or turning the ships. The placing of minor parts, which forms the greater portion of the work of fitting out a ship, is rapidly and economically carried out by two auxiliary quick-acting travelling cranes with a capacity of from five to 10 tons, installed to operate along the pier on each side of the main crane.

The crane as designed and constructed consists of a fixed portal 56 ft. square, supporting on deep girders an octagonal tower about 56 ft. in width at the bottom and tapering to a bearing pintle 5 ft. in diameter at a height of approximately 201 ft. above the deck of the pier. Supported vertically on this bearing pintle and revolving upon it is a horizontal cantilever jib or boom 300 ft. in length overall, to which is rigidly attached a "skirt" that envelopes the fixed tower from the bottom of the jib down to a height just above the portal. The entire vertical load from the jib is transmitted to the tower at the pintle, but lateral thrusts are taken into the base of the octagonal tower by the circular girder that forms the rim of the "skirt," as well as at the pintle.

The forward cantilever of the jib contains the three runways for the trolleys that carry the loads. The rear cantilever of the jib carries the counterweight and the house containing the machinery and drums for hoisting and lowering loads and racking the trolleys in and out on the forward cantilever. The machinery for revolving the jib is located at the lever at the top of the portal. girder and the rotating impulse is transmitted through the rim of the "skirt." This enveloping "skirt" provides a greater factor of safety against failure by over-turning of the jib in the event of accidental excessive overloading of the crane, than would be given by the more usual design, at one time under consideration, in which the jib is simply supported by the tower on a circular bearing similar to that of a swing bridge or a turntable. The entire framework of the crane is of structural steel of bridge grade, and the entire operation is by means of electricity.



An impressive view of the 350-ton electrically-operated hammerhead crane at the League Island Navy Yard, Philadelphia, U.S.A. For the details of this crane, and also for the photographs, we are indebted to the McMylor Interstate Co., Cleveland, Ohio.

Access to the jib, machinery-house, etc., is provided by means of a steel stairway in the tower and an electric elevator mounted on the outside of the "skirt" and the jib.

The forged steel hooks by which the loads are raised have, in the case of the 175-ton hook, a shank 9 in. in diameter, and in the case of the 350-ton hook one of 13 in. diameter. The 50-ton block and load are carried by eight $1\frac{3}{8}$ in. wire ropes; the 175-ton block and load by sixteen $1\frac{5}{8}$-in. wire ropes running on 50-in. pulleys; and the 350-ton hook and load by thirty-two $1\frac{5}{8}$-in. wire ropes. The 350-ton hook is carried from the two 175-ton blocks by a steel equalizing beam, 4 ft. $10\frac{1}{2}$ in. in depth.

The clear lift of the main hook is 141 ft. above and 29 ft. below the deck of the pier, and that of the auxiliary hoist 151 ft. above and 29 ft. below. The three trolleys carrying loads in and out on the forward cantilever of the jib operate on separate runways—the one 50-ton trolley to a distance of 190 ft. from the centre of the tower and the two 175-ton trolleys to a distance of 115 ft. from the centre. The two latter are arranged so that they can be coupled together in order to lift, by means of the additional hook and equalizing beam already mentioned, the capacity load of the main hoist, namely, 350 tons.

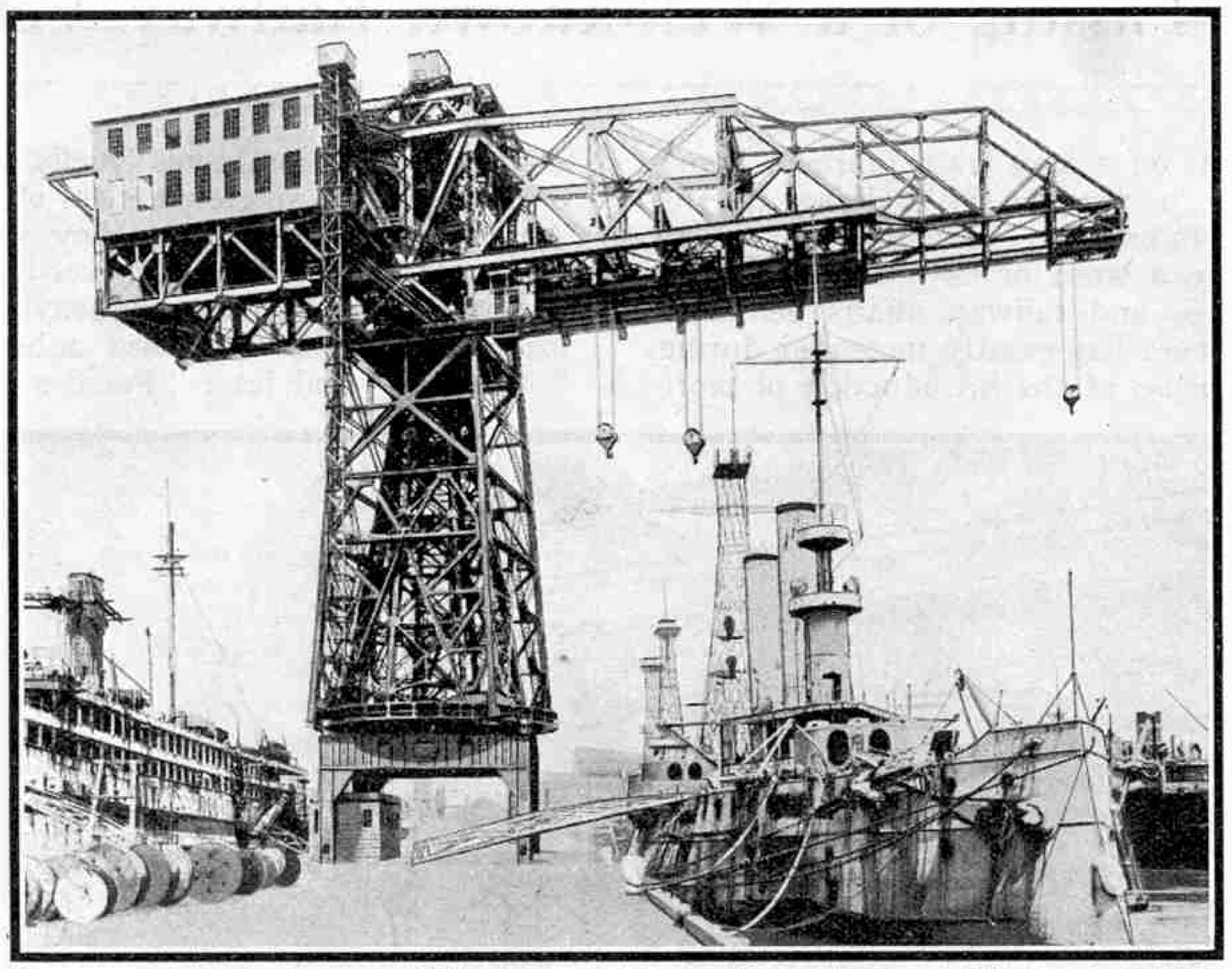
The forward cantilever is 200 ft. in length, 40 ft. in width from the tower to the limit of travel of the main hoists, and 13 ft. 4 in. beyond them. Its trusses have a depth of 40 ft. at the tower. The rear trusses carrying the machinery-house and the counterweight, are 100 ft. in length and 20 ft. in depth and form a cantilever 40 ft. in width.

The machinery-house itself is a large building 80 ft. in length, 43 ft. in width and 32 ft. in height. It contains the machinery for hoisting and lowering the hooks and for racking the trolleys. The two main hoisting motors and the one auxiliary hoisting engine are of 87 h.p. each; while the two main racking motors and the one auxiliary racking motor are each of $27\frac{1}{2}$ h.p. The drums on which the ropes for the main hoists are wound are 10 ft. in diameter and 14 ft. in length, and revolve on a shaft $10\frac{1}{2}$ in. in diameter. The machinery-house carries also an overhead travelling crane of the bridge type of 35 tons capacity (determined by the weight of the main drum and drum shaft) for the handling

of machinery. The runway on which this crane operates extends through the rear wall of the machinery-house for a distance of 17 ft. By lowering the rear wall of the house, which is specially designed for the purpose, the crane is permitted to travel out beyond the end of the building in order to transfer parts to and from the fitting-out pier approximately 215 ft. below.

The counterweight is of concrete and weighs 628,000 lb.

The pintle supporting the rotating part of the structure (jib and "skirt") is of cast steel, 60½ in. in diameter; and when the crane is loaded to its rated capacity, carries a vertical load of 5,834,000 lb; and takes a lateral thrust due to maximum conditions of wind, loading and eccentricity, of 607,000 lb. The vertical load is taken by means of 220 roller bearings, 3 in. in diameter; and the horizontal thrust by 62 rollers 2 in. in diameter. The metal of the bearing rollers is a high-carbon, high-chromium tool steel with the exceptional ultimate bearing strength of 290,000 lb. per sq. in. after hardening treatment, raised from 96,000 lb. per sq. in. before treatment.



The crane as seen from the fitting-out pier in the Navy Yard. A 10-storey building could be placed under the massive jib.

The eccentricity just mentioned is due to the fact that the jib is designed so that the overturning moment, or the tendency of the jib to overturn, is equal and opposite in direction under each of the two conditions of no loading and maximum rated load. In the case of no load on the crane, the centre of gravity of the rotating mass is 12.45 ft. behind that of the tower; and in the case of maximum load 10.65 ft. in front. This tendency toward overturning is resisted by the horizontal bearing of the bottom rim of the "skirt" on the circular girder encircling the tower legs, as well as by the horizontal bearing at the pintle. The horizontal thrust at the bottom rim of the "skirt" is taken up by means of sixty-four 26-in. wheels mounted on two chains and bearing on a circular girder 55 in. in depth and 64 ft. in diameter.

The slewing or revolving mechanism located at the top of the portal consists of an 87-h.p. motor with gearing driving four pinions working into a rack 64 ft. in diameter having 768 teeth of 3.1416-in. pitch and 12-in face.

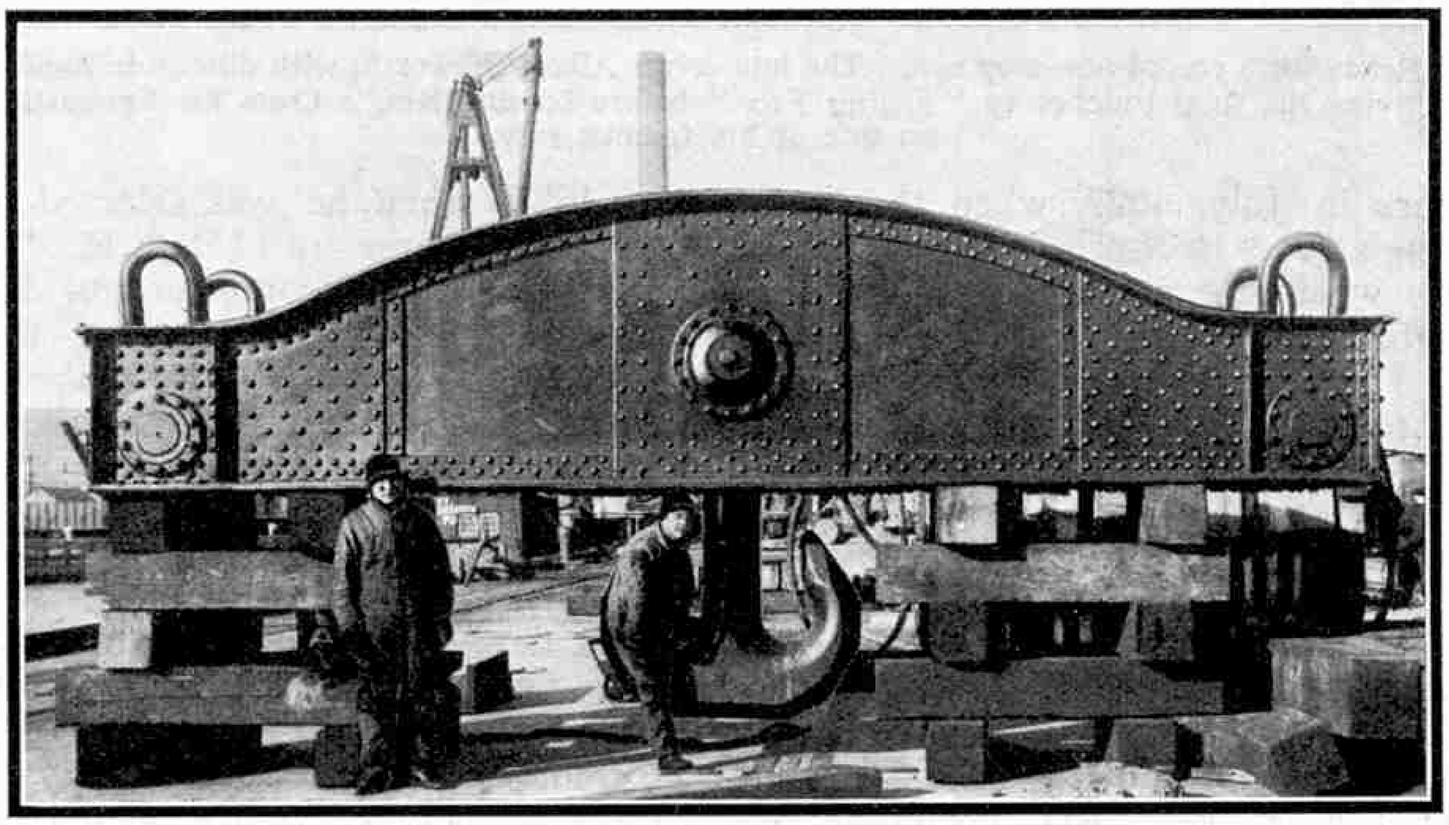
The operating speeds of the crane are as follows:—Hoisting—Main hoist, 2½ ft. per minute; auxiliary hoist, 15 ft. per minute. Racking—Main trolley, 15 ft. per minute; auxiliary trolley, 80 ft. per minute. Revolving—One complete revolution in 12 minutes.

All the operations of the crane are controlled from the operator's cab, located under the jib, adjacent to the tower and in full view of all the handling operations of the crane. The machinery is controlled from the cab by means of master controllers operating solenoid switches situated in the machinery-house. Clutches for throwing the hoists into high or low gear, and for coupling together the main hoists when using the equaliser beam, are located in the machinery-house and are mechanically operated by levers in the operator's cab. The structure is designed so that when it becomes necessary to renew pintle bearings or make repairs the entire loading structure can be jacked up from the portal by means of four 30-in. jacks, each of 560-tons capacity.

The portal has four legs spaced 56 ft. from centre to centre, each of a sectional area of 385 sq. in. of structural steel, supporting the massive girders 9 ft. in depth that carry the octagonal tower. The maximum load on one of these legs was calculated at 3,000,000 lb. under maximum conditions of wind pressure, and the legs and the foundations were designed for this load. The portal has a clear height of 25 ft. 7 in., which provides ample clearance for locomotive cranes or other equipment on the two tracks passing through it. A power sub-station that furnishes the current for the operation of the crane is also situated beneath the portal, as shown in the upper illustration on this page.

The entire deadweight of the crane structure is calculated at 4,000 tons. Four bolts, 3 in. in diameter, are used to anchor each leg to the foundations.

The four tower legs are supported on grillages, 10 ft. 4 in. square, each made up of two layers of rolled steel girders embedded in massive reinforced concrete caps, 35 ft. 4 in. square and 9 ft. 6 in. in depth, tied together longitudinally and transversely by the deep reinforced concrete girders of the pier deck. Each of these caps rests on 156 timber piles driven to the hard cemented gravel river bottom and cut off at water level. The piles are supported laterally by an earth fill enclosed and retained by reinforced concrete sheet piles driven into the river bottom. Most of these sheet piles are 18 in. by 24 in. in section, 52 ft. in length and weigh about 12 tons. They are tongued and grooved to interlock one with another to form a reinforced concrete wall around the entire foundation, 24 in. in thickness, and spanning from caps and lateral connecting girders to the river bottom.



The steel equalising beam, by which the 350-ton forged steel lifting hook is carried from two 175-ton blocks on the crane jib. The beam has a maximum depth of 4 ft. 10½ in.

Each of the two auxiliary travelling cranes has a maximum lift of 130 ft.—of which 90 ft. is above and 40 ft. is below the level of the pier—and a maximum radius of 140 ft. at which it can be rotated at a speed of 300 ft. per minute.

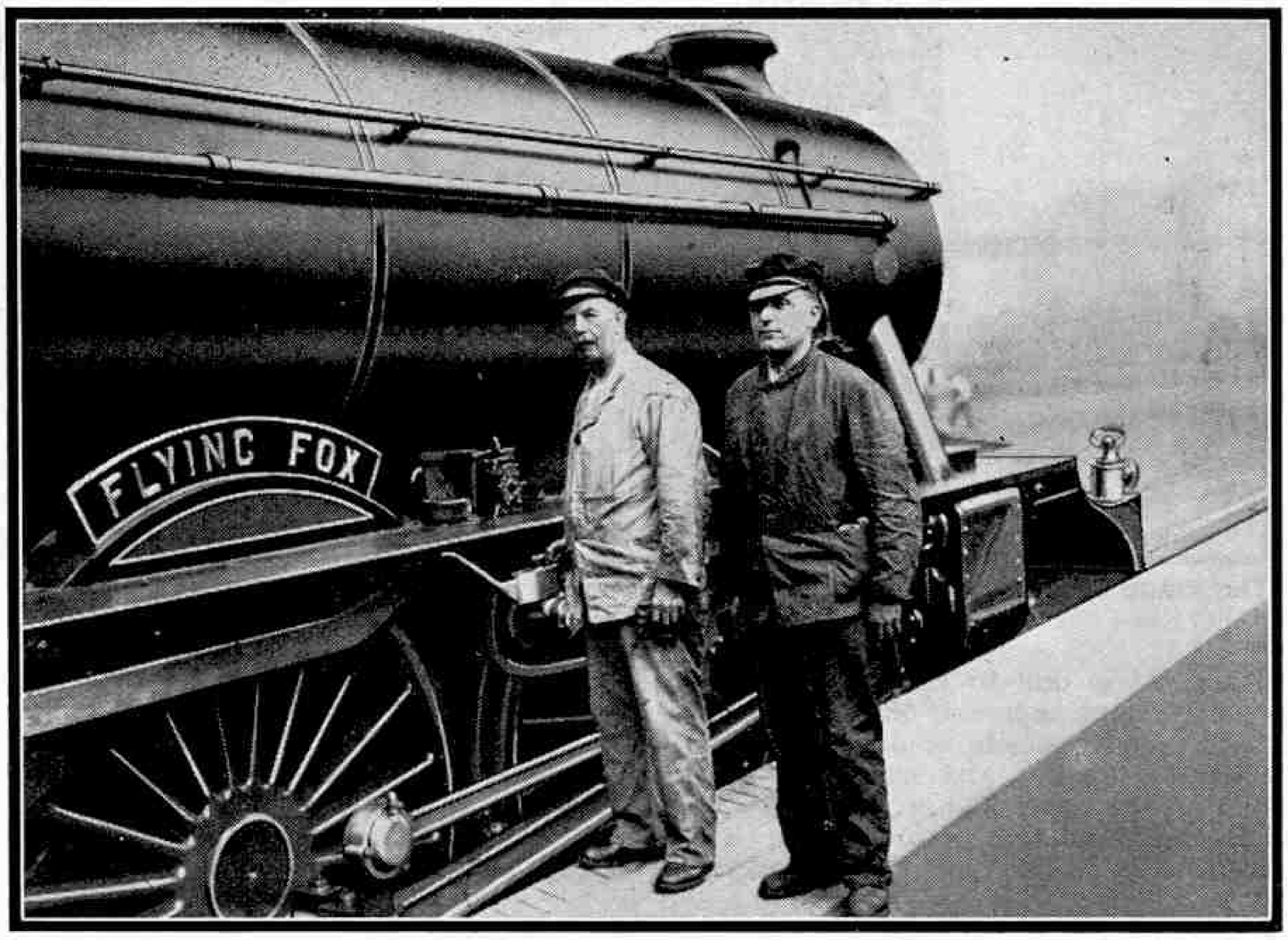
The construction and erection of this giant crane occupied 11 months and cost almost two million pounds.

A Driver of Famous L.N.E.R. Expresses

The Passing of a Well-known Railway Veteran

BEFORE setting out on a long train journey, many passengers make a practice of walking to the head of the train in order to glance over the engine and, perhaps, exchange a word or two with the crew. The interest in engines and railway affairs generally that this action evidences has greatly increased during the last few years because of the introduction of more powerful locomotives and of non-stop expresses that cover distances that formerly would have been regarded as incredible. Attention is once more directed to the engine drivers under whose charge the giants carry out their tasks, and these men have become known as personalities to the general public.

In recent years perhaps the best-known locomotive driver has been Albert Pibworth of the L.N.E.R., and his death on 16th September last was regretted by one and all. Driver Pibworth attained considerable prominence in July, 1927, when the first non-stop run from King's Cross to Newcastle was made, and also a year later, when the non-stop service was extended to Edinburgh. Driving the first of the long non-stop expresses of the L.N.E.R. was by no means the only remarkable service he performed, however, and we feel sure that readers will be interested in some other details of his long career.



Ready for a record non-stop run. The late driver Albert Pibworth, with oil-can in hand, giving the final touches to "*Flying Fox*" before leaving King's Cross for Newcastle on one of his famous runs.

Driver Pibworth made his first acquaintance with railway work as long ago as 1883, and on 8th September of that year he joined the service of the Great Northern Railway Company, which, of course, has since become part of the L.N.E.R. He passed through the usual routine training, acting as locomotive cleaner and doing other work in the engine sheds, becoming a regular fireman five years after joining the service. His appointment as a spare driver followed, and on 3rd July, 1897, he became a fully passed driver on the Great Northern Railway system.

As Mr. Pibworth did not retire until 1929 it will be seen that his period of service extended over 46 years, during which he saw many great changes. When he became one of the regular drivers on the System, "Pacifics" were unknown on the Great Northern Railway, the locomotives chiefly used on the main line expresses being single-wheelers of the "Stirling" type. Although extremely fast, they were eventually found incapable of hauling the ever-increasing loads. This meant the introduction of heavier and more powerful locomotives, with increased adhesive weight, and first "Atlantics" and later "Pacifics" came into use.

Driver Pibworth's career covered every stage in the development from the use of single-wheelers with light trains to that of the powerful "Pacifics," capable of hauling trains weighing 400 tons over distances of 300 and even 400 miles without a stop. As one of the most experienced and skilful drivers of the system he took an actual part in this development and had charge of many famous engines.

A splendid tribute to Driver Pibworth's skill and knowledge of the engines that he drove was paid in 1925, when he was selected as one of the drivers to take charge of L.N.E.R. "Pacifics" that were exchanged for locomotives of the G.W.R. "Castle" class. In these famous trials the locomotives of the "foreign" Company were placed at the head of crack expresses and required to work to the usual schedule. In this manner Driver Pibworth had what to him undoubtedly was the pleasure of working the famous G.W.R. "*Cornish Riviera Express*" with an L.N.E.R. "Pacific." For a stranger with a locomotive that has been designed for work on a different line the task of running such an express was stupendous, but with "Pacific" No. 4474 Driver Pibworth put up fine performances, and the work steadily improved as he became more accustomed to the road to the West.

More spectacular driving feats came two years later. In July, 1927, the L.N.E.R. decided to work the 9.50 a.m. Scotch Express non-stop from King's Cross to Newcastle, and Driver Pibworth was selected to drive the first of these expresses. At that time the journey of 268 miles from London to Newcastle was the longest booked non-stop run in the world, and the inauguration of the service aroused great interest, not only in the railway world but among the general public. *(Continued on page 17)*

Largest Meccano Models Ever Built

Crane 25ft. High in Drury Lane's Meccanoland

AFTER an interval of ten years pantomime has again made an appearance at Drury Lane. The season began on Christmas Eve, and to Meccano boys the Theatre Royal has since become the most attractive place in London, if not in the entire universe. The reason for this is quite simple—Meccanoland has become a reality!

The pantomime shows the adventures of The Sleeping Beauty and her gallant rescuer, Prince Florizel, and in one scene the stage of the famous theatre is filled with Meccano models built on a scale previously undreamed of by the majority of those who now gaze at them in admiration. These include old favourites such as Cranes, Big Wheel, Windmill, Beam Engine, etc. Around them play Meccano boys clad in the familiar jerseys, and they show their worth by building a splendid Aeroplane in which Prince Florizel flies away to snatch Princess Beauty from the grasp of the Witch.

It is splendid to see how the boys rally to the help of the Prince when he stumbles into their midst, tired and hungry, after vainly trying to follow the Witch as she flies through the air on a broomstick. At the bidding of the Good Fairy the smaller among them struggle with nuts and bolts almost as big as themselves, while the bigger boys form themselves into gangs to carry the huge girders into place, and with their screwdrivers and spanners they quickly put together a substantial Aeroplane.

The Prince admires it very greatly, but seems doubtful if it will really fly. He ought to know better than that, of course! The Fairy is well acquainted with the capabilities of Meccano, and merely tells him to step in and see. The propeller then begins to turn, the Aeroplane rises slowly from the ground and the delighted Prince flies away to the Witch's Tower in order to rescue the charming Princess from captivity.

On the opening night this brilliant scene was greeted with tremendous applause and similar enthusiasm has been displayed at every succeeding performance. It is difficult to imagine anything that would make a greater appeal to modern boys. There must be very few who do not possess an Outfit and have not built with it Cranes, Bridges, Motor Cars, Aeroplanes and countless other models. To see these reproduced on such a magnificent scale, illuminated by arc lamps of many colours, and to realise that their favourite hobby is playing such a wonderful part in the heroic rescue of the Sleeping Beauty—that is a spectacle that arouses in them the utmost enthusiasm.

In view of the great excitement that the discovery of Meccanoland in Drury Lane has caused, the manner in which the giant models have been constructed will interest readers. The work of preparing the scenes occupied two months. The models are constructed in correct style from what are practically giant standard parts of wood, and each was first built in Meccano in order to provide a pattern for the giant version seen on the stage. Every detail is faithfully reproduced, and the giant models work in exactly the same manner as those of ordinary size built from standard Meccano parts of steel and brass.

The giant Swivelling Crane is the central feature of the scene and it is certainly the model of which the builders are most proud. It is 25 ft. in height and is fitted with hoisting tackle exactly like that of its prototype. The model is painted silver and the glittering light of the arc lamps gives it the appearance of one built from nickel-plated Meccano parts. Another splendid model is the Limousine in which the Princess makes a very imposing entrance. This is as large as a real car and its appearance causes gasps of astonishment, for to Meccano boys it seems as if one of the most popular of Meccano models has been enlarged and has suddenly come to life! This model really moves under its own power and is driven by means of an accumulator and a small electric motor.

In addition to the giant models there are many that are simpler and smaller. They include Trucks and Scooters on which the Meccano boys taking part in the scene disport themselves—to the envy of their brethren in the audience! These models are painted in the new Meccano colours and their bright appearance adds variety to a scene that is crowded with interest.

The gorgeously produced pantomime, of which the Meccanoland scene forms such an important part, is thoroughly enjoyable to Meccano boys of all ages, and is guaranteed to restore to good humour the most miserable of mortals. The man who perhaps is most delighted by the success of "*The Sleeping Beauty*" is Mr. Julian Wylie himself, the producer, for he also is a Meccano "boy," and moreover the one who possesses the largest models ever built—a distinction of which he is very proud indeed!

A Meccano Crane 25 ft in height! Assembling the wonderful model before conveying it to Meccanoland at the famous Drury Lane Theatre.

Before Christmas Mr. Wylie probably was the busiest man in England. He is not content with producing one pantomime, but actually is responsible for no less than five! Naturally his preparations for Christmas did not include the delights of making a round of brilliantly illuminated shops in anticipation of splendid presents. Instead he made innumerable train journeys on which he travelled thousands of miles, and for several weeks he was never seen without a bundle of railway timetables under his arm. One day found him in Edinburgh, the next in London; on the following day he was rehearsing in Birmingham; and flying visits to Liverpool and Manchester were sandwiched between return trips to the other cities in which he is interested.

How Mr. Wylie must have longed for a Magic Carpet or some equally miraculous means of travel! It is surprising that he has not already produced one, for in his younger days he was a conjuror and was associated with David Devant and other famous wizards. Certainly he needs something of the kind, for he has produced no fewer than 63 pantomimes and 80 musical plays. He has been responsible for a larger number of successful entertainments than any living producer and his work in this connection must have involved a stupendous amount of travelling. Fortunately he enjoys work and pantomime production is one of his favourite hobbies!

To-day all the productions on which Mr. Wylie has worked so hard are in full swing and giving enjoyment to thousands of people. He is able to enjoy the fun himself and nothing gives him more pleasure than to hear the tremendous applause that greets the Meccanoland scene at Drury Lane. No Meccano boy who lives in or near London should fail to see "*The Sleeping Beauty*." Probably it is quite unnecessary to urge them to do so, for the creation of Meccanoland has made a wonderful impression.

Insulated Containers for Perishable Goods

The L.M.S. were pioneers in the use of containers for the transport of goods, and now the idea has been carried further by the introduction of heat insulated containers of a similar type for the conveyance of perishable goods. These are to be used chiefly for the carriage of meat and will abolish unnecessary handling that is liable to result in deterioration, for the meat will remain in a cold atmosphere until it reaches cold store or the shops from which it is to be sold.

The insulated containers are roomy, for they are 12 ft. in length, 6 ft. 2 in. in width, and 6 ft. 4 in. in height. They are constructed of wood and are painted white outside, the interior being varnished in order that they may easily be washed out. Each is fitted with a pair of swing doors opening outward at the sides and also with a door at the end.

Efficient insulation is provided by a lining of cork slabs 2 in. in thickness surrounding the entire container. The containers now being constructed have less insulating material in the floor and more on the roof than those already in use, for in hot weather it is on top that the direct rays of the sun will fall.

The containers are quite airtight and their contents may be lifted by means of slings connected by four chains to the roof. When empty they weigh 35 cwts., and will travel on special railway wagons with screw couplings and automatic brakes suitable for use on fast goods trains.

London "Tube" Extensions

The London Underground Railways have decided upon important extensions in the near future. The "Piccadilly Tube" is to be extended northward from Finsbury Park. One new line is to start at the Stroud Green Road end of the present line and continue to Tottenham, a distance of two miles.

It is also intended to increase the speed of trains; to provide more escalators; and to build a vast underground station at Hyde Park Corner.

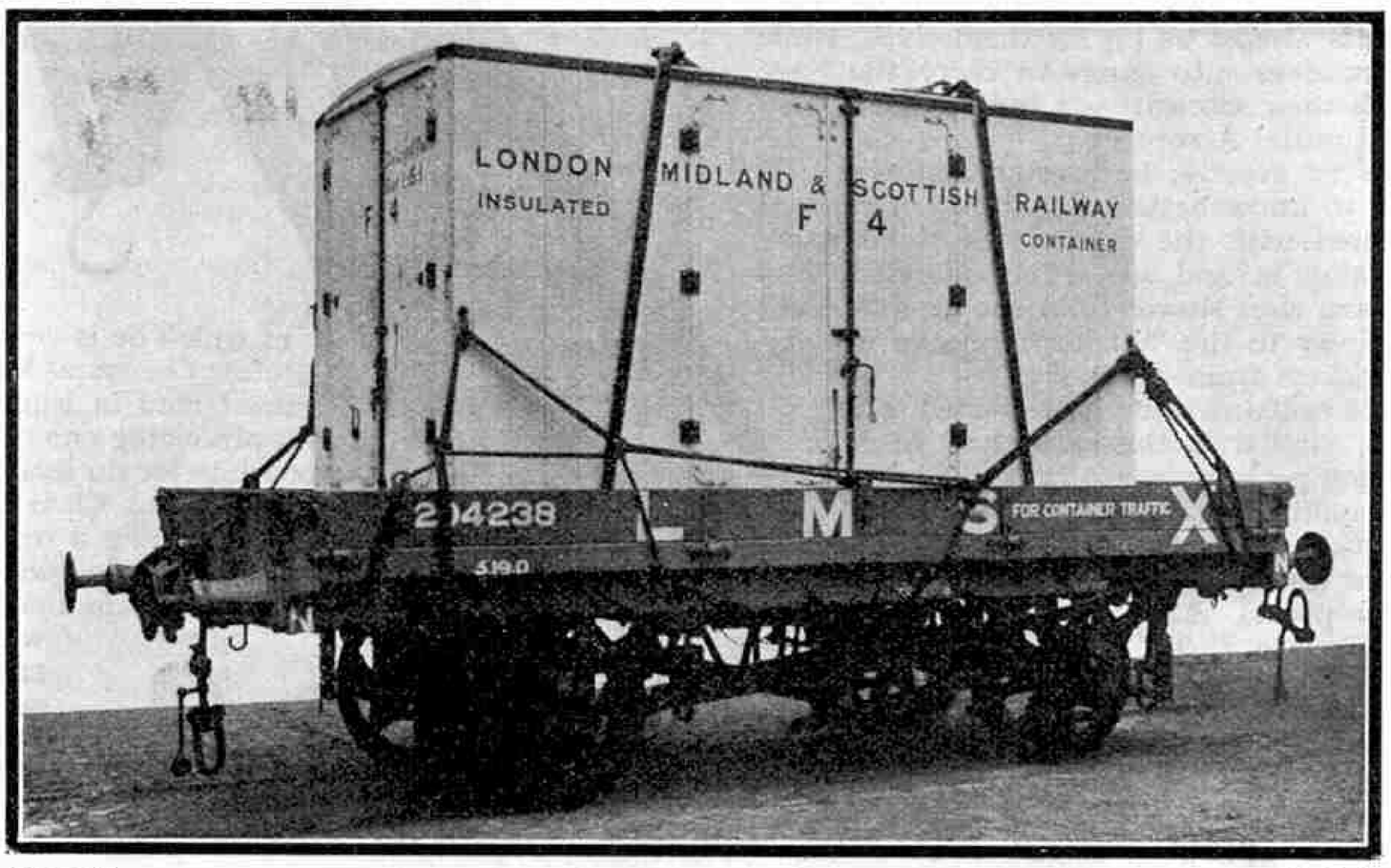
Giant Cable for Australia

The heaviest length of cable ever made in England, recently left the Enfield Cable Works for Thames Wharf for shipment to Sydney Harbour, Australia. This unusual load weighed 140 tons and was moved by L.N.E.R. special train consisting of engine, brake-van, and 50 wagons.

Double tracks were kept clear for the 12 mile journey from Brimsdown to the Docks, which was made at midnight to avoid disturbance to the busy suburban traffic over the rails during the day.

Driver of G.W.R. No. 1 Retires

A G.W.R. engineman who has recently retired had the distinction of driving Engine No. 1 for many years before it was scrapped in 1924. This locomotive was a 2–4–0 Side Tank built at Swindon Works in 1880, and the driver says that he found it strong, excellent in running, economical in coal consumption and a splendid time-keeper. At one time it worked passenger services between Chester and Birkenhead, and on one occasion was seen together with L.N.W.R. No. 1 in Woodside Station. These two locomotives presented a striking contrast in appearance. The L.N.W.R. representative was "*Clive*," a tender locomotive of the 4–4–0 "Precursor" class. It had inside frames, while the G.W.R. engine had outside frames and bearings.



Courtesy] [*L.M.S.*

One of the insulated containers, introduced on the L.M.S., in which perishable goods are conveyed to their final destination without unnecessary handling. The insulation is provided by a lining of cork slabs.

Trains to Fit Tunnels

The Southern Railway has built three new corridor trains of special dimensions for the line from London to Hastings via Tunbridge Wells.

The necessity for the construction of rolling stock of a narrow width on this particular section of the line arises from the fact that between Tonbridge and Hastings there are six tunnels whose dimensions are so restricted as to render the passage of standard rolling stock impracticable.

The new stock, which has been constructed at the Company's works at Lancing and Eastleigh, differs, for the reasons stated, from the standard type of corridor coach in width and seating accommodation, the body length and width of the new stock being 58 ft. by 8 ft. ¾ in. Owing to the comparatively narrow width of the new stock, it is only possible to provide seating accommodation in each compartment for four first-class passengers and six third, as against the standard corridor coach which accommodates six first-class and eight third-class passengers per compartment.

A notable feature of the new coaches is the high window lights on the corridor side of the train, which enable even a very tall man to look out in comfort. This feature is one which the Southern Railway have now adopted as standard for all new corridor coaches. Two other trains of similar coaches are being constructed.

Poppet Valve Locomotives on L.N.E.R.

Two L.N.E.R. locomotives of the "Shire" class, No. 335 "*Buckinghamshire*" and No. 352 "*Leicestershire*," have recently been fitted with rotary cam poppet valve gear supplied by Lentz Patents Ltd.

In the Lentz gear the cam shaft lies transversally across the locomotive above the cylinders and is rotated from the driving axle by shafts and gears on the right-hand side of the engine only. Lubrication is provided for the cam shaft and valve spindles by a mechanical lubricator.

Southern Railway Locomotive News

Three more engines of the "Lord Nelson" class have been turned out from the works at Eastleigh. They are: E862 *"Lord Collingwood,"* E863 *"Lord Rodney,"* and E864 *"Sir Martin Frobisher."* These have smoke deflector plates as fitted on *"Lord Nelson."*

By way of experiment, Mr. Maunsell has made important alterations in two engines of this class. No. E860 *"Lord Hawke"* has been fitted with a boiler 10 in. longer than the standard. This has increased the total heating surface from 2,365 sq. ft. to 2,494 sq. ft. The other altered engine is No. E859 *"Lord Hood,"* which has been provided with coupled wheels 6 ft. 3 in. in diameter in place of the usual 6 ft. 7 in.

Three "Lord Nelsons" (Nos. E860-1-2), are now stationed at Nine Elms and, together with several "King Arthurs," they compose a "link" which works The *"Atlantic Coast Express"* and other important expresses out of Waterloo to the West of England and Bournemouth.

Engine No. A629, a 2–6–0 tender engine of the "U" class, has been fitted to burn pulverised fuel.

L.M.S. Locomotive News

Over 70 of the standard 0–8–0 freight engines are now in service, the latest out being Nos. 9563 to 9572. Nos. 9555-9 have been allocated to the L. & Y. section of the Central division. Engines of this type have now become familiar objects on many parts of the L.M.S. system. No. 9566 was noted recently on the former North London line.

Further L.N.W.R. engines have been adapted for working over the Midland division. These include Nos. 5344 and 5366 of the *"George the Fifth"* 4–4–0 class; No. 5727 of the *"Prince of Wales"* 4–6–0 class; and No. 5165 of the *"Renown"* 4–4–0 class. Only 35 of the celebrated *"Jumbos"* (2–4–0 type) now remain.

The normal winter loading of the *"Royal Scot"* express (10 a.m. from Euston) is 15 coaches, made up as follows: 7 for Glasgow, 5 for Edinburgh, 2 for Aberdeen, and 1 for Dundee.

G.W.R. Notes

At the time of this Magazine going to press no further engines of the "Hall" class had been turned out at Swindon but Nos. 4961-4 were nearing completion.

Some new bogie postal vans are building at Swindon for use on the mail trains which run on the G.W.R. 100 additional banana vans are to be built. They will be insulated and steam-heated.

44 engines of the "Flower" class (4–4–0 with inside cylinders) have been withdrawn from service and only 27 remain. Of the similar, but slightly larger, "City" class, nine have been broken up, leaving 11 still at work.

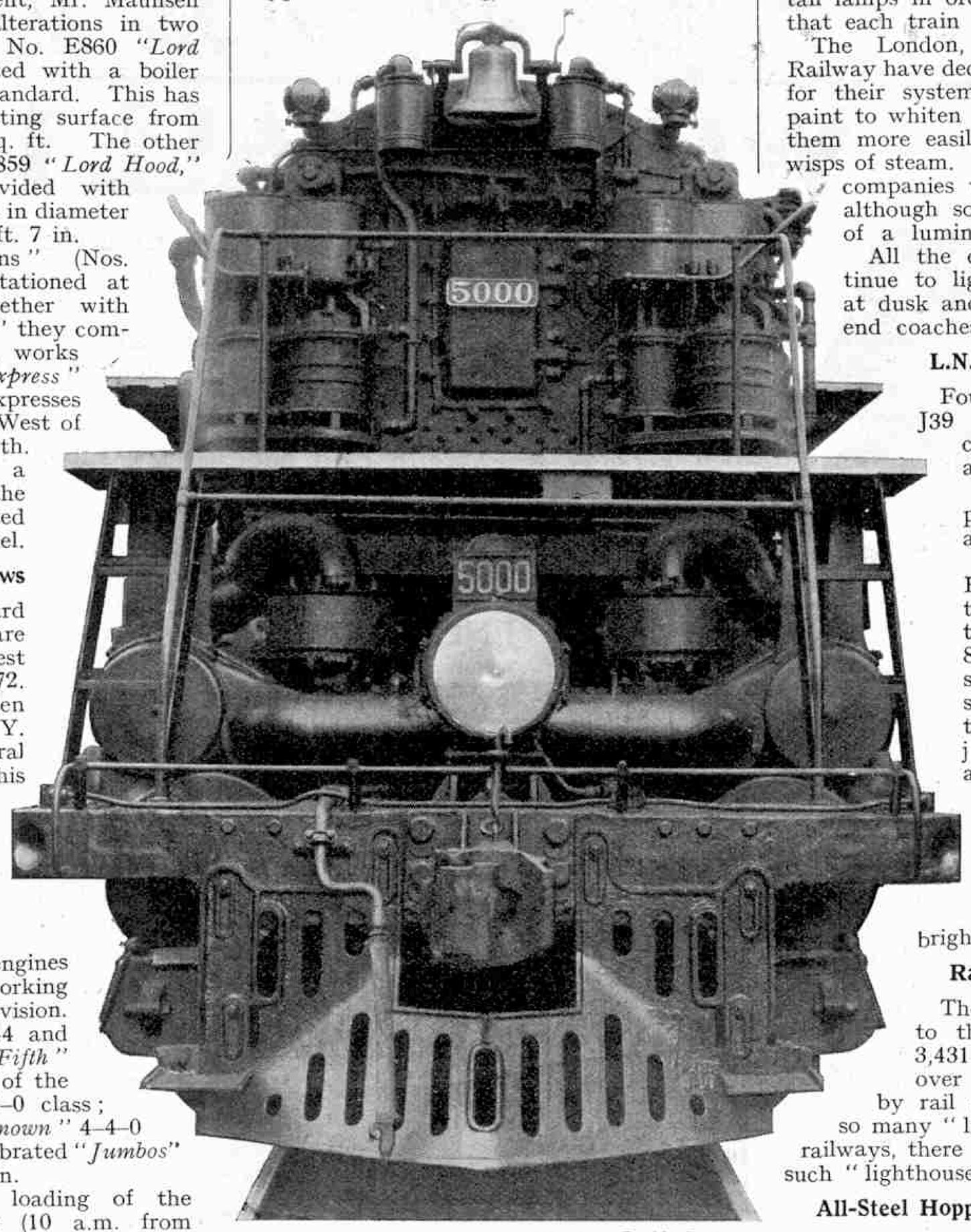
For the 51 miles of track to be laid this year 123,000 steel sleepers and 50,000 tons of steel rails have been purchased.

A Thousand more L.N.E.R. Wagons

Contracts for 1,000 12-ton mineral wagons have been placed with six British firms by the L.N.E.R.

American Locomotive Weighing 367 Tons

On 10th October, 1929, the first of a new series of locomotives of the 4–8–4 type reached Chicago for service on the Chicago and North Western Railway. These locomotives are of immense size and power, and are both longer and heavier than other types in use on the same line. The weight of engine and tender is 367 tons, and their total length is 103 ft. 4 in. Since they have a tractive effort of 65,200 lb. and are capable of high speed, they may be used on fast freight trains as well as on passenger service. A booster giving additional tractive effort of 11,300 lb. is fitted. The boiler has a diameter of 8 ft. 4 in., and the grate ares is 100 sq. ft. Steam at a pressure of 250 lb. per sq. in. is used. The tender is carried on 6-wheeled bogies and has water space for 18,000 gals., and a coal capacity of 20 tons.



Courtesy [*Northern Pacific Railway*

Front view of No. 5000, the new giant freight locomotive of the Northern Pacific Railway. **(See page 33).**

White Tail Lamps for Trains

The railway companies of this country are considering how best to overcome a difficulty that has arisen owing to the exhaust steam from the steam-heating apparatus sometimes obscuring the tail lamps during the winter daylight hours. Signalmen are required to observe these tail lamps in order that they may know that each train as it passes is complete.

The London, Midland and Scottish Railway have decided to adopt as standard for their system the use of aluminium paint to whiten the tail lamps and make them more easily discernible in spite of wisps of steam. It is expected that other companies will follow this practice, although some may favour the use of a luminous paint.

All the companies will still continue to light the train tail lamps at dusk and show red lights on the end coaches of all trains.

L.N.E.R. Locomotive News

Four more engines of the J39 (0–6–0) class have been completed at Darlington and are numbered 2776-9.

Some further 4–6–0 express passenger engines are to be built during 1930.

Two of the former Great Eastern 4–4–0 engines of the "Super-Claud Hamilton" type—Nos. 8783 and 8787—are always kept in specially good repair and smart condition for working the frequent Royal Train journeys between London and Wolferton (for Sandringham). These engines present a very attractive appearance as a large amount of brass, copper, and steel work is kept brightly polished.

Railway "Lighthouses"

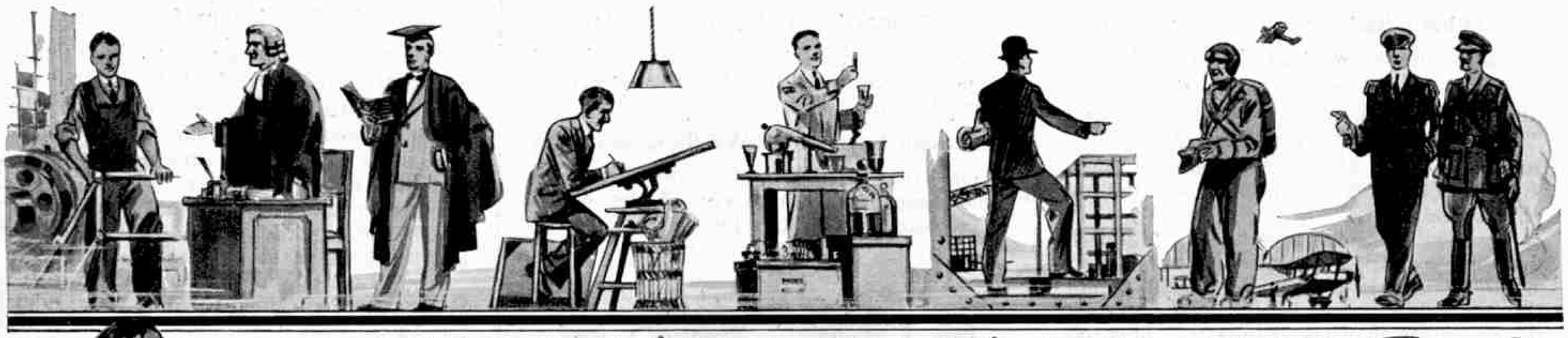
The L.N.E.R. call attention to the fact that they have 3,431 signal boxes watching over the safety of travellers by rail and they liken these to so many "lighthouses." On all our railways, there must be well over 10,000 such "lighthouses."

All-Steel Hopper Wagons for L.M.S.

Four hundred all-steel 20-ton hopper wagons specially designed for the conveyance of ore have been ordered by the L.M.S.

The underframe of each wagon is constructed of rolled steel channel girders, and two inner sole plates half an inch in thickness are used to secure the body side plates. The body is built up of mild steel plates riveted together and these are supported by angle stanchions in pairs at each side, while steel gusset plates are riveted to the body and frames at each end. The top of the body is finished with angle section capping.

Two balanced doors are provided. Each is operated by a separate lever, one of the two necessary being placed on each side of the vehicle. When closed they are held in position by a cam connected to the operating handle, which is locked by a French pin inserted in the fulcrum bracket. Cast steel oil axle boxes are used.



WHAT SHALL I BE ?

III.—Electrical Engineering—Electric Supply Work

[In the two previous articles in this series we dealt with the means by which boys and young men become fully trained Mechanical and Electrical Engineers respectively. The second of these articles, which appeared in the *"M.M."* for last month, explained the steps that should be taken by those who are attracted to the manufacturing side of Electrical Engineering. Naturally, this should be followed by an article on the operating or power station side. In dealing with this aspect of our subject we have been fortunate in obtaining the assistance of Mr. P. J. Robinson, M.I.E.E., M.I.Mech.E., the City Electrical Engineer of Liverpool. He has very kindly written, specially for the *"M.M.,"* the following authoritative article on the subject, in which he is a recognised expert.—EDITOR].

"What shall I be?" the question that forms the subject of these articles, is one that exercises the minds of all boys at some period in their lives. The ability to answer it rightly depends upon a variety of influences, and not the least of these is the possession of information regarding the nature of the chosen career, its advantages and drawbacks, and the best method of making a start. The earlier articles in the series were written to assist those who contemplate entering various branches of Engineering, and in the present article attention is paid to that section of the profession covering the generation and supply of electricity.

FAMOUS ENGINEERS—3

Photo] [*Lafayette, Ltd.*

Mr. P. J. Robinson, M.I.E.E., M.I.Mech.E., is the City Electrical Engineer of Liverpool. He began his career as an apprentice to Johnson & Phillips, the well-known manufacturers of electrical plant, later studying the principles of his profession at Finsbury Technical College. He became engineer and manager of an electric supply company that eventually was taken over by the Corporation of Liverpool, and since December, 1927, he has held the position of City Electrical Engineer.

It is not always appreciated that an electric supply undertaking is a highly organised business including a large variety of occupations. The personnel of such an undertaking is in many ways similar to that of a mechanised military unit. The rank and file includes unskilled labourers, such as cleaners and navvies; tradesmen of all varieties, including fitters, turners, pipe-fitters, joiners, wire-men, and cable-jointers; and machinery attendants such as boiler firemen, turbine drivers, sub-station attendants and switchboard operators. Immediately supervising the work of these various tradesmen are their respective charge hands and foremen, who may be regarded as the civilian equivalent of the non-commissioned officers in the army. The more highly trained technical staff, such as the power station shift engineers, mains engineers, etc., correspond to the commissioned officers of the military unit.

In most large electric supply undertakings there is a limited number of approved applicants who are employed as apprentices to particular trades. On concluding their training these youths are, as far as possible, absorbed into the organisation, where they gain further experience in constructional and maintenance work. The type of apprenticeship obtained in an electric supply undertaking is identical with that of a good engineering works, and does not embody any specialization peculiar to electric supply work. The result is that any tradesman who is master of his craft is qualified for employment in an electrical undertaking, irrespective of whether his apprenticeship has been with a supply authority or in a works.

We all know that in the army there are cases of exceptional merit in which one of the rank and file works his way to a commission. In the same way, a man may rise to a position on the supervisory technical staff of an electric supply undertaking from the ranks of the tradesmen or machinery operators. This is exceptional, however, and in general a boy who wishes to enter an electric supply undertaking with a view to occupying a superior position requires a somewhat different training. In such a case, the best course is to serve an apprenticeship with a firm of repute, preferably one manufacturing generating plant and electrical equipment, although this is not essential, providing the boy obtains a varied experience in the shops.

Such an apprenticeship should be of three years duration at least, and should be followed by a course in Engineering at a Technical College or a University. This technical training should culminate in the taking

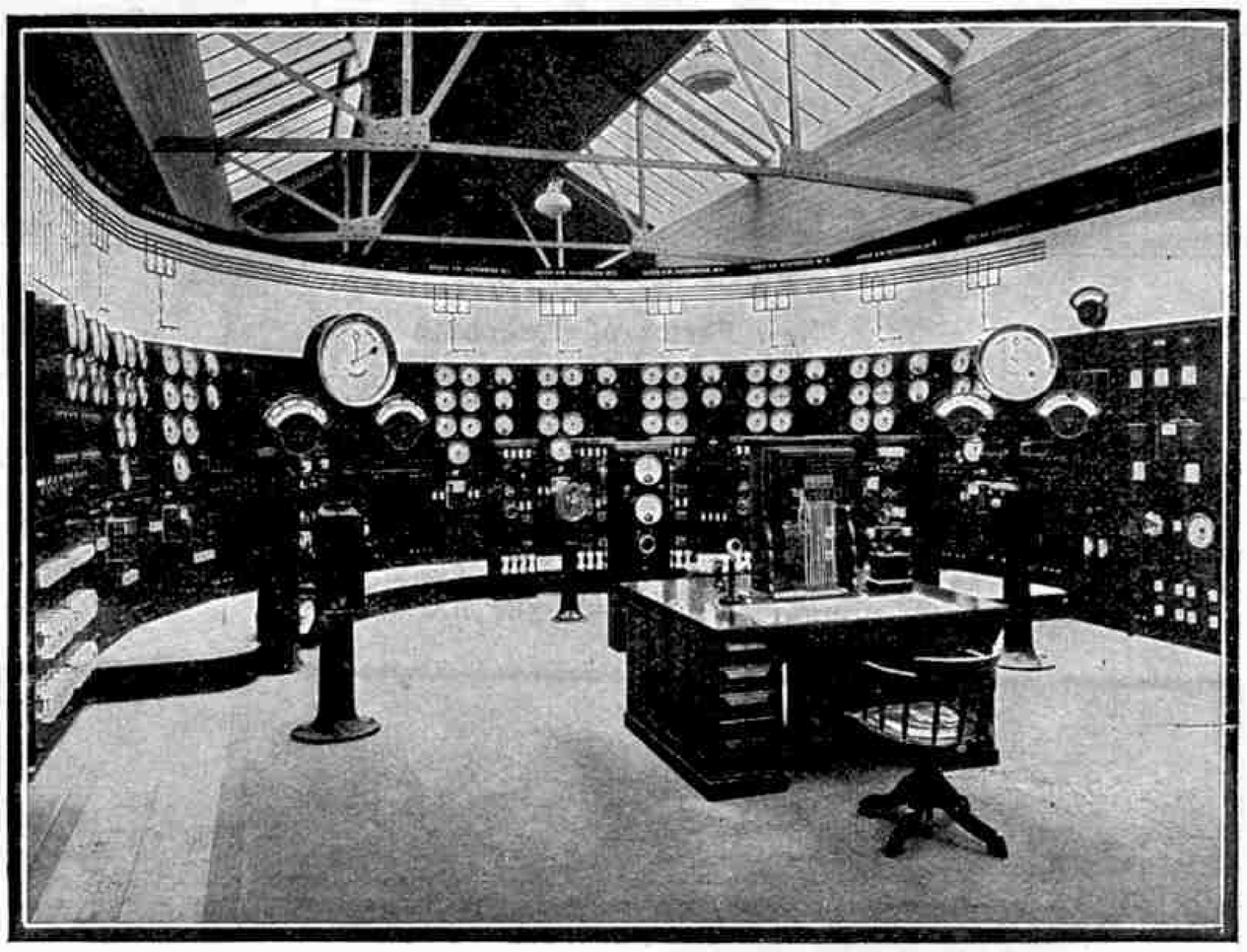
of an engineering degree or an equivalent diploma. If the circumstances are such that this proceeding is not possible, then the boy should follow, as far as possible, the same course of studies at night classes whilst he is serving his apprenticeship. It should be pointed out, however, that such a combination of practical and theoretical work necessitates a considerable amount of hard work and self-sacrifice.

After the theoretical qualifications have been obtained it is desirable to gain erection experience with a firm engaged in the manufacture of electrical generating plant and equipment. Quite apart from the value of such experience, in many cases work of this kind offers opportunities of entering the employ of supply undertakings. It often happens that a man sent out to instal, repair, or test plant is taken over by the customer in order to operate and maintain the plant, with which, of course, he is perfectly familiar.

Either following such erection experience, or without it if for any reason it cannot be obtained, the young engineer should endeavour to obtain a position in an electric supply undertaking either as a junior shift engineer in the power station or as a junior mains engineer on the distribution side. After this, future progress will depend entirely on the ability and initiative shown.

The foregoing, of course, do not represent the only avenues of approach to the electric supply industry, but they are the more usual. As a boy who determines to go in for engineering does not usually decide at the outset eventually to enter an electric supply undertaking, one who desires to adopt the profession of engineering is well advised to serve an apprenticeship in an engineering works. Here he will get training on a variety of work, and he can then follow this by a course either at a Technical College or a University.

The choice of works at which the apprenticeship is served depends largely on individual inclination and circumstances. Details of such apprenticeships appeared in the November and December issues of the "*Meccano Magazine*," and it only remains in this instance, to emphasize most strongly the importance of supplementing the practical training by a definite course of technical instruction terminating in the obtaining of some recognised diploma.



Courtesy] [*Liverpool Corporation*

Part of the control room of the Lister Drive Power Station of the City of Liverpool. The combined capacity of the three stations of which this is part is 126,000 k.w. This illustration is taken from the Editor's "Book of Electrical Wonders," published by G. G. Harrap & Co. Ltd.

Courtesy] [*University of Birmingham*

A portion of the Senior Electrical Engineering Laboratory at Birmingham University. With the aid of up-to-date testing plant the students are given thorough instruction in the fundamental principles of this branch of engineering.

The writer also would strongly advise boys, wherever possible, to obtain an approved Matriculation Certificate before leaving school. This qualification not only represents the first step towards the obtaining of an engineering degree, but also obtains for the holder exemption from the preliminary examinations leading to membership of the various professional Institutions.

The value of a good general education, even if a Matriculation Certificate is not obtained, cannot be overestimated. Any tendency to specialize on engineering while at school should not be unduly encouraged, as a sound knowledge of the fundamental principles of physics, chemistry, mechanics, and mathematics, together with a knowledge of some foreign modern language and the ability to express himself clearly in writing, is much more valuable.

A boy who intends to become an engineer should avoid any tendency towards indifference to culture as expressed by literature and the fine arts; providing he does not permit such interests to predominate over professional matters, an engineer gains more than is often realised by being a man of sound education and culture. As a matter of fact, contrary to the usual idea that engineering is a materialistic profession, it is one that offers as great opportunities for self-expression and exercise of imagination as are to be found in architecture, painting, or literature.

It must be borne in mind, however, that it does not require as many men to operate plant as it does to manufacture it, and that for every 50 men employed in a factory manufacturing electrical equipment, only one would be necessary to supervise the operation and maintenance of the plant when installed.

Future of Schneider Trophy Contest

The Air Ministry have announced a change in the policy of the Government in regard to the Schneider Trophy Contests to be held in 1931 and subsequent years. After careful consideration it has been decided that a Royal Air Force team will not again be entered, thus leaving British participation in the Contest to private enterprise under the auspices of the Royal Aero Club.

The entry of R.A.F. teams in recent years has changed the character of the Contest, which originally was intended to be a sporting international event with entries of a private character. The intervention of the Government gave a much needed impetus to the development of high speed aircraft, but the chief purpose of this has now been served, for sufficient data have been collected to enable further practical developments of great value to be made. For this reason the necessary large expenditure of public money is no longer considered to be justifiable.

This decision should not prevent the entry of British machines in future Contests. Convincing proof has been given of the capabilities of the British aircraft industry, and it is hoped that the wide public interest displayed will make it possible for British pilots and machines to compete in these interesting and important Contests.

Business Man's Flying Record

A London business man some time ago completed his 200th flight across the Channel in the Air Liners of Imperial Airways. This is claimed as a record for cross-Channel flights for purely business purposes by any one passenger.

The gentleman who has created this record frequently leaves London in the morning, conducts business abroad, and returns in time for dinner the same evening. It is calculated that during his 200 flights he has flown more than 100,000 miles. On one occasion he chartered an Air Liner in order to undertake a business tour of several cities in Europe. This step enabled him to make in one week a tour that otherwise could not have been completed in less than a month.

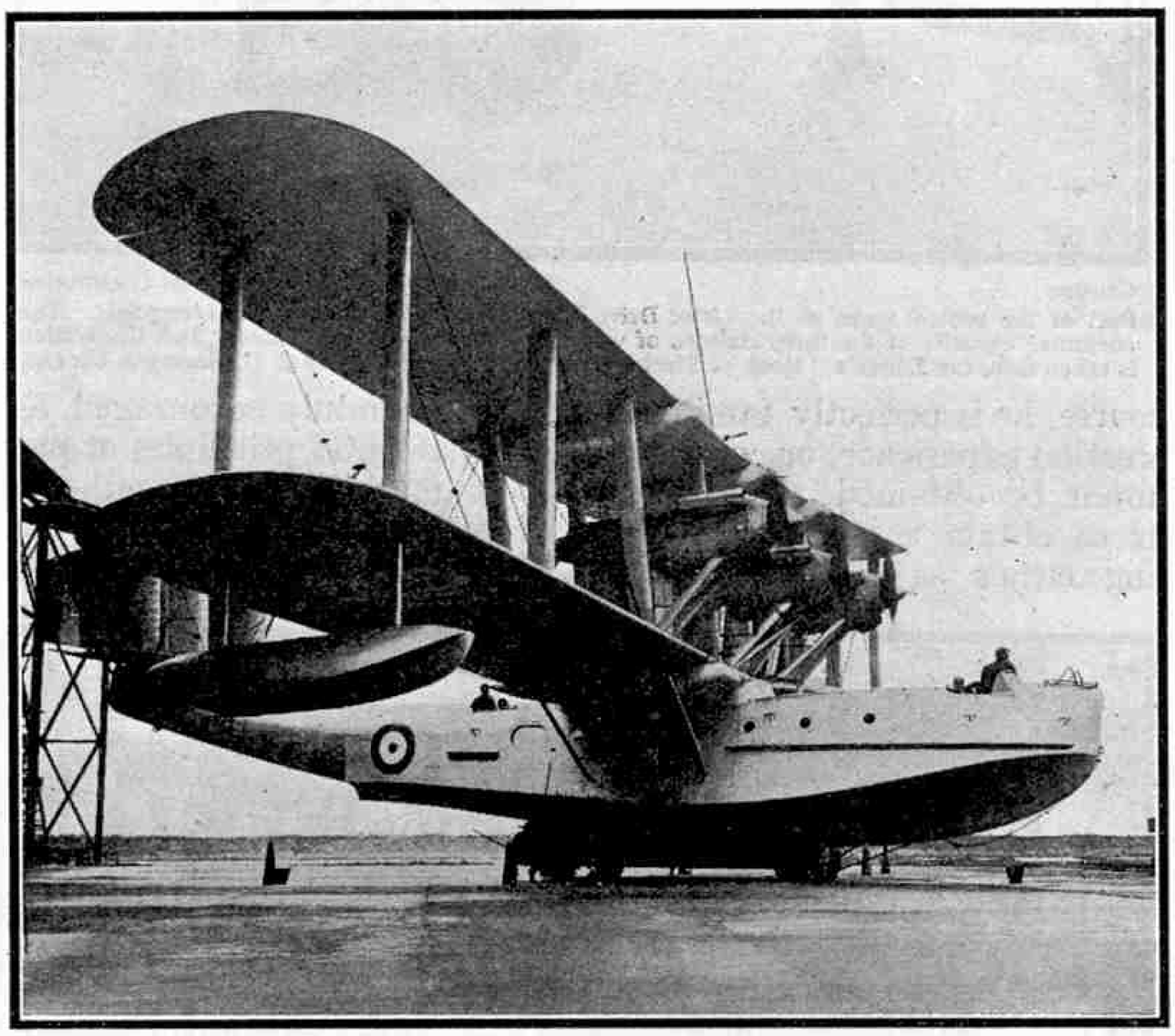
New Forms of Parachute

Interesting experiments with various forms of Irving parachute have been carried out by American Army Authorities. In one of these the familiar circular main-sail was replaced by one of triangular shape, in which the corner of the fabric was unhampered by shroud lines. Air escaping from beneath the sail caused the small area thus left free to flap violently. The vibrating silk acted as a propeller and gave a horizontal speed of about 4 m.p.h. to the parachute. This enabled the pilot to steer and control it to a much greater extent than is possible with a parachute of the standard circular shape.

The experiments are being continued. Among other interesting forms a spring-operated pilot-parachute is being tried, and further developments are awaited with great interest.

A Cheap Aero Engine at Last?

It has been reported that a cheap aero engine is to be produced by Morris Motors Ltd., of Oxford, the well known motor car manufacturers. Authentic details are not yet obtainable, but it is understood that the engine will be of the radial air cooled type.



Courtesy] [*Rolls-Royce Ltd.*

The Blackburn "*Iris III*" flying boat. This machine, which is equipped with three Rolls-Royce "Condor" engines developing a total of 1,950 horse power, is the largest flying boat ever constructed in England.

Safety in Foggy Weather

An interesting experiment was carried out in America a short time ago by Lieut. J. H. Doolittle, the winner in 1925 of the Schneider Trophy Contest. In a two-seater "Consolidated" biplane, Lieut. Doolittle flew a distance of 14 miles and finally returned to the aerodrome, having in the meantime been unable to see out of the cockpit. His machine was fitted with a gyroscopic compass and improved types of altimeter and turn indicator, but the instrument of the greatest value to the pilot in this amazing feat was a wireless-operated direction indicator.

This interesting invention was described on page 24 of the "*M.M.*" for February, 1929. It consists of two vibrating rods that are operated by a pair of electro-magnets, these in turn being controlled by a wireless beam broadcast from the aerodrome. While the aeroplane remains in the direct path of the beam, the two rods vibrate to an equal extent and make vertical lines of the same length on a sheet of paper. But if it deviates from its course the lengths of the lines become unequal, warning the pilot in which direction he is going wrong.

During the test Lieut. Doolittle was accompanied by a reserve pilot to take control in the event of the apparatus failing to function, but his services were not needed. Further experiments of this nature may eventually lead to a reduction of the risk run when flying in foggy weather.

Broadcasting of Weather Charts

A practical demonstration of the value and usefulness of a Fultograph picture receiving outfit was given in Germany, when a synoptic meteorological chart was wirelessed to an aeroplane in flight. The sending of the complete map occupied exactly three minutes, and it has been stated that the results obtained were so satisfactory that the equipment of passenger-carrying machines with a Fultograph is to become a universal practice throughout Germany. There can be no doubt that greater safety in aerial navigation will result when all pilots receive these graphs of prevailing weather conditions.

The Armstrong-Whitworth "Atlas"

This interesting aeroplane has a wing span of 39 ft. 6 in., an overall length of 27 ft. 8½ in., and is 10 ft. 6 in. in height. The wings possess a total area of 391 sq. ft. The petrol tanks have a capacity of 76 gallons and the machine carries 7 gallons of oil, giving an air endurance of about 3¼ hours.

The "Atlas" may be equipped either with an Armstrong-Siddeley "Jaguar" or a "Jaguar Major" engine, and in each case a Townend ring is a standard fitting. When employing the second of these engines its weight is 4,165 lb., and at sea-level it has a speed of well over 154 m.p.h. At a height of 15,000 ft. the speed falls only to 143.5 m.p.h., and with a geared and supercharged engine a speed of no less than 168 m.p.h. may be attained at a height of 20,000 ft. above sea-level. The absolute ceiling with a supercharged engine is 28,000 ft., but the service ceiling is 26,700 ft.

The Armstrong-Whitworth "Atlas" aeroplane has been in use for some time in the Royal Air Force as a standard 2-seater machine for Army Co-operation work. For this purpose it is fitted with two guns, a camera, wireless transmitting and receiving sets and gear by means of which messages may be picked up from the ground while the machine is in flight. It also may be used for light bombing and for this purpose carries four bombs of 112 lb. weight. A similar aeroplane without armament is used in the Royal Air Force for advanced instruction.

The "Atlas" may be fitted with floats to enable it to alight on water, or with skis for use on frozen ground. The landing speed of the machine when fitted with automatic slots is 54 m.p.h., and a military load of 880 lb. is allowed.

Courtesy] [*A. V. Roe & Co. Ltd.*

An interesting photograph showing the nose of the Avro "Andover," a machine that has been extensively used both for commercial purposes, and as an ambulance.

Air Mail Collected During Flight

Much progress has recently been made in regard to the picking up and delivering of mail bags by aeroplanes at points other than aerodromes or landing fields. In this connection it is interesting to note that Luft Hansa, the well-known German firm, are now experimenting with apparatus of this nature, in order to enable their machines to deliver and take up mail bags without stopping. Full details of the apparatus to be used are not yet obtainable, but it is stated to be similar to that used by British military aircraft for Army Co-operation purposes.

A demonstration of the system used by the Royal Air Force was given during the display at Hendon in the summer of last year. The message to be picked up was carried in a special bag suspended on a piece of cord fastened to the points of two lances, the butts of which were driven into the ground, and the machines picked it up on a grapnel hook hung at the end of a short cord.

Replies to messages received in this manner were merely attached to a streamer and thrown from the cockpit. It is scarcely likely that the Luft Hansa machines will deliver mail bags by throwing them out, and it is said that they intend to suspend them from a cable and fly the machines over a large fork stuck in the ground, by means of which the bag will be trapped and detached.

Passenger Transference while in Flight

For the first time on record, an aeroplane has been used to take a passenger from an airship in flight. The feat was accomplished in America, the passenger being on the U.S. Navy Airship "*Los Angeles.*" When the airship was in flight, an aeroplane of the Vought "Corsair" type flew underneath it, and was secured to it by means of a special apparatus beneath the envelope. The passenger was let down through an opening in the airship until he could clamber into the cockpit of the aeroplane, which was then released.

THIS MONTH'S AIR STORY

Airman (as machine rapidly approaches the ground in a spinning nose-dive): "Hurrah! We're in luck, old chap! We're crashing right on top of a hospital!"

The A.B.C. "Hornet" Aero Engine

The A.B.C. "Hornet" aero engine is the latest product of A.B.C. Motors Ltd., and is intended for light aeroplane work. During the war this firm produced four types of aero engines. These were named the "Gnat," "Mosquito," "Wasp" and "Dragonfly" respectively. They were noted for their great reliability under trying conditions, and were succeeded by the "Scorpion" and the "Hornet."

The "Hornet" is of the air-cooled four-cylinder type, the cylinders being horizontally opposed in pairs. They possess a bore of 4 in., a stroke of 4.9 in., and are machined from solid steel bars with integral fins. The cylinder heads are of cast-iron construction, and each is fitted with two overhead inclined valves.

The engine has a total dry weight of 225 lb. and normally develops 75 h.p. at 1,875 r.p.m. It may be run for short periods at 2,075 r.p.m., when it develops a maximum of 81 h.p. The fuel consumption when running at normal speed is approximately 4.9 gallons per hour.

It is interesting to note that "*A.D.1,*" the recently launched airship constructed by the Airship Development Company, is equipped with a 75 h.p. "Hornet" engine operating a tractor airscrew. The "Hornet" also is fitted as standard to the Civilian Aircraft Company's new two-seater light coupé monoplane.

World's Gliding Record

During the past few months there has been a rivival of interest in the sport of gliding, and a new duration record has been set up by Lieutenant Dinor. At Rhön-Rositten, East Prussia, Lieut. Dinor remained in the air for no less than 14 hours 44 mins., thus surpassing the previous record of 14 hours 9 mins., set up in 1927 by Ferdinand Schultz.

It is interesting to note that the greater portion of this record-making flight was carried out during the night. Lieut. Dinor took off one afternoon at 3.15 and remained in the air until about 6 o'clock next morning. During this remarkable effort the aviator actually glided so low that he was able to converse with spectators, and to keep them informed of his perfect safety.

There is a movement on foot to popularise gliding in Britain, and it is the hope of enthusiastic followers of the sport, that a number of gliding clubs will be formed in various parts of the country.

New American Air Mail Service

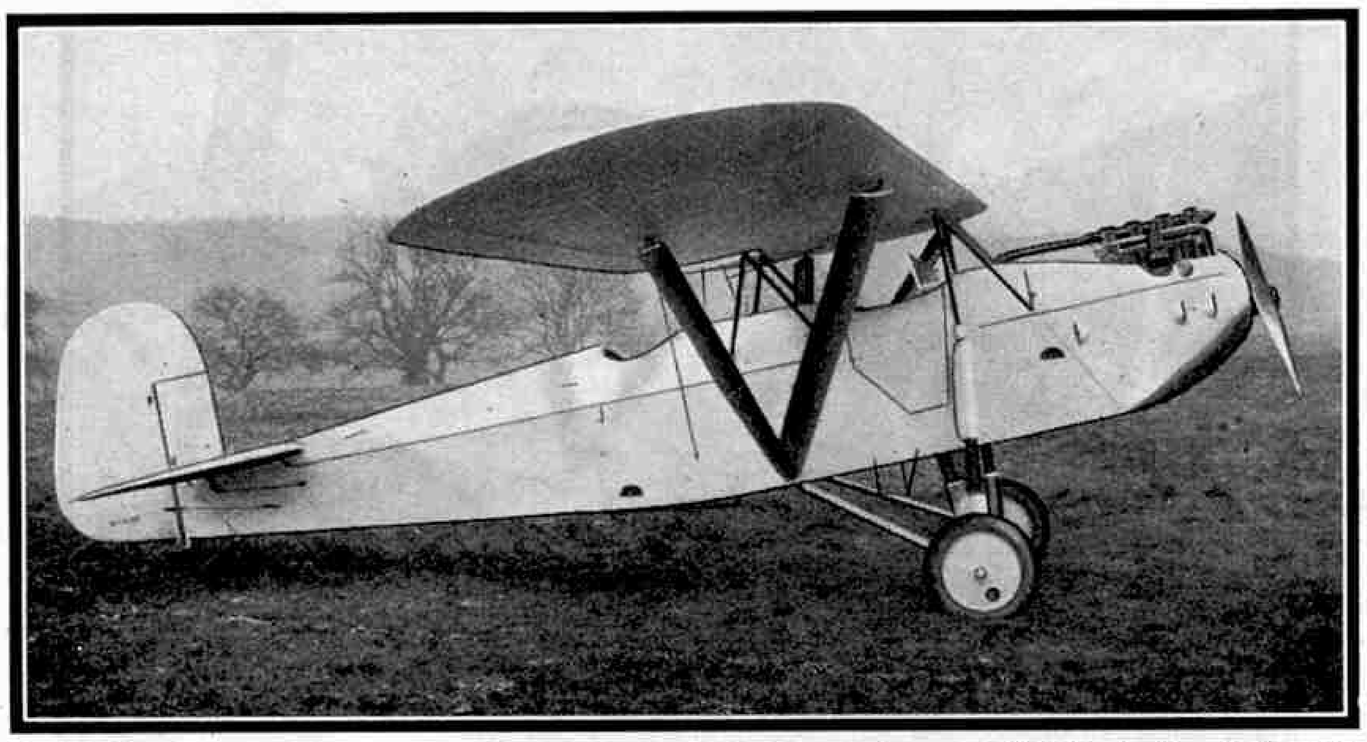
A new American air mail service between New York and Los Angeles is shortly to be inaugurated. Three-engined Fokker machines will be used, and the 2,500 miles will be covered in 24 hours' flying time.

Famous Aero Engines

X.—The "Cirrus" Mark III

THE "Cirrus" aero engine has been described as "the engine that made the light aeroplane possible," and there is no doubt that it is in the forefront of the many excellent engines designed and produced specially for light aeroplane work. The engine made its appearance in May, 1925, and it was the first low-power aero engine to complete successfully the British Air Ministry's 100-hours type contest for aero engines.

The "Cirrus" engine may be considered to have grown up with the light aeroplane, for when the introduction of this class of aircraft called for a reliable engine of low-power, the "Cirrus" Mark I, of 27-60 h.p. filled the gap. As light aeroplanes of improved construction and greater strength were produced, the "Cirrus" engine kept pace with developments, and the Mark I engines were followed in 1926 by a second series that received the designation of Mark II. This engine was of 30-80 h.p., and it made its first appearance in a "Moth" light aeroplane flown by Capt. Geoffrey de Havilland during the King's Cup air race in the same year. The Mark III engine, now in general use, is rated at 85-95 h.p., and has proved under greatly varying conditions to be one of the most efficient and economical engines ever produced.



Courtesy] [*Westland Aircraft Co. Ltd.*

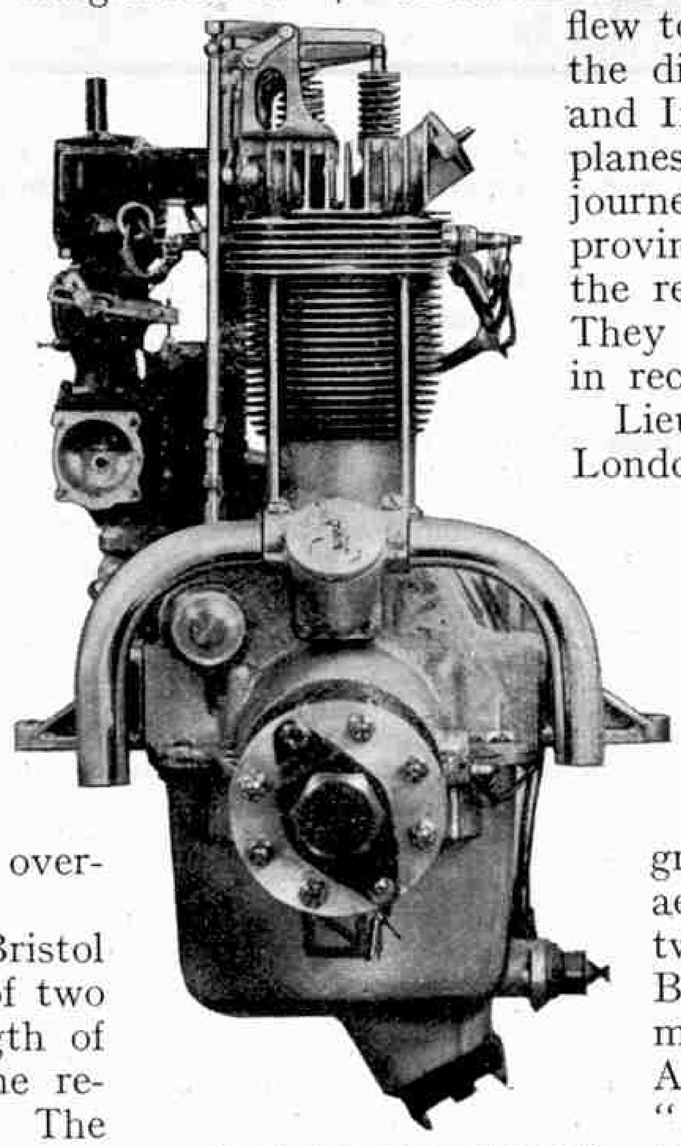
The Westland "Widgeon" equipped with "Cirrus" engine. This photograph gives a good impression of the clean lines of the "Widgeon."

Collective data from three light aeroplane clubs operating four engines over a period of 2½ years show that the engines had 3,083 hours' flying to their credit. This gives an average number of hours per engine of approximately 771, and on one engine 826 hours were recorded. The average time between overhauls was 280 hours, and in one case the engine ran for 354 hours before overhaul was considered necessary.

Five engines in service with the Bristol and Wessex Aero Club during a period of two years were in operation for a total length of time of 1,450 hours, the maximum time recorded for one engine being 403 hours. The engines were given a complete overhaul every 360 hours and a top overhaul usually was required after 120 hours' flying. During the whole of the two years, on an average four gallons of fuel and half a pint of oil were consumed per hour, the cost per running hour, including maintenance, overhaul and spares being 1/1⅛ per mile.

The King's Cup air race was won in 1926 and 1927 by "Cirrus-Moth" machines, and this year a "Cirrus-engined aircraft finished in the second place. The first long-distanced flight with a "Cirrus" engine was made in June, 1925, by Sir Alan Cobham in a "Moth" aeroplane. It consisted of a "day-return" flight between London and Zürich, the distance flown being approximately 1,000 miles.

The two outstanding aeronautical events of 1927 were the journeys from London to Karachi and London to Capetown made in "Cirrus-Moth" machines by Captain Stack and Mr. Leete, and Lieut. Richard R. Bentley, A.F.C., of the South African Air Force. Captain Stack and Mr. Leete flew together in two machines for the whole of the distance of 5,500 miles between England and India, setting up a record for light aeroplanes. It is interesting to note that the journey included a 250-mile sea crossing, proving that the pilots had complete faith in the reliability of their machines and engines. They were afterwards awarded the A.F.C. in recognition of their flight.



A front view of the "Cirrus" engine. We are indebted to Cirrus Aero Engines Ltd., for this and the lower photograph on the opposite page.

Lieut. Bentley's solo flight eclipsed the London-Karachi journey by 2,500 miles. It was made between the 1st and 28th September, and was considered by the committee of the Royal Aero Club to be the most distinguished air feat of the year. In recognition of this flight Lieut. Bentley received the 1927 Britannia Trophy.

There can be no doubt that one of the greatest feats ever accomplished in a light aeroplane was the 11,000-mile flight between England and Australia made by Mr. Bert Hinkler in February, 1928. The machine used was the original "Avro-Avian," equipped with the fifth standard "Cirrus" engine to be produced. Mr. Hinkler accomplished the flight in 15½ days, and throughout the whole journey the "Cirrus" engine required no special

attention except routine checking of the tappets, etc.

A record that still stands was set up two months after Hinkler's flight by Lady Bailey in her own D.H. "Cirrus-Moth," when she made the 18,000-mile journey from London to Capetown and back. Lady Bailey was the first women to accomplish this flight, which is also the longest solo flight ever accomplished.

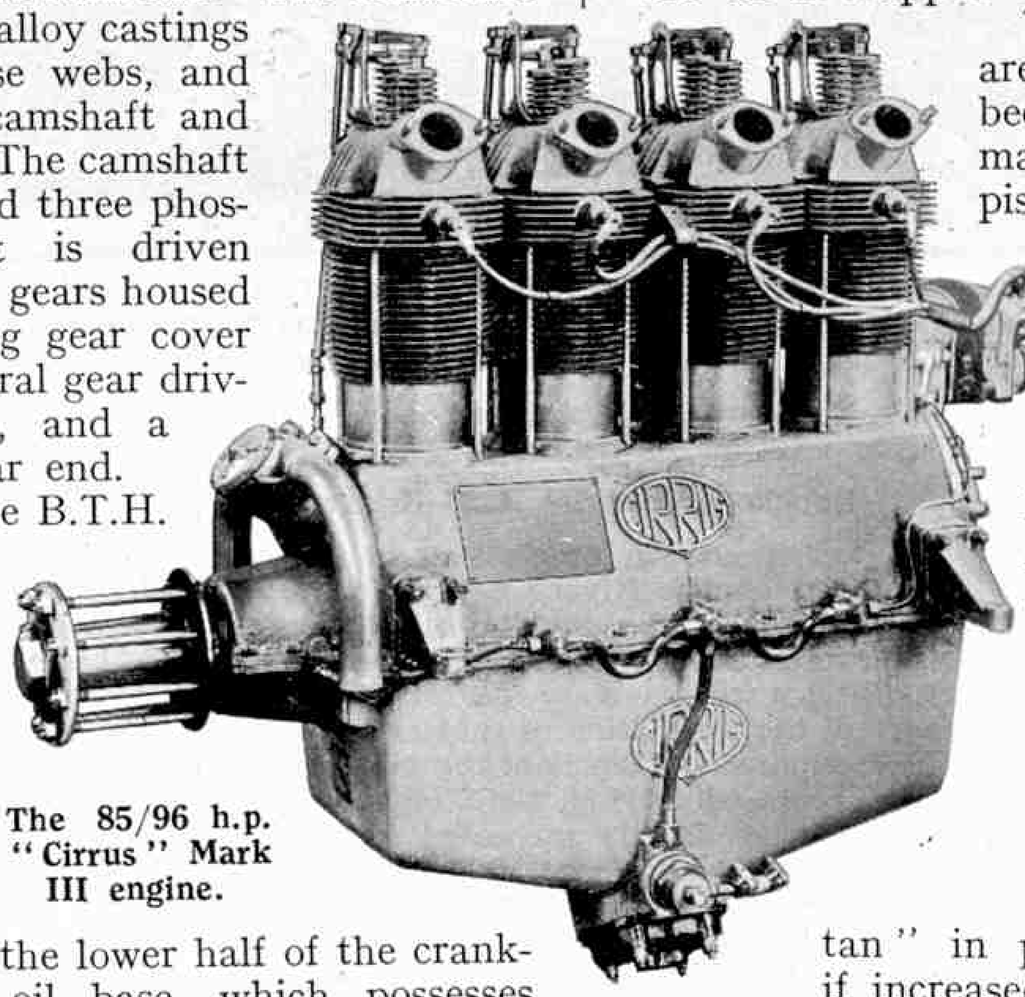
Courtesy] [*A. V. Roe & Co. Ltd.*

The "Avro-Avian" machine in which Mr. Bert Hinkler flew to Australia. Mr. Hinkler is in the centre of the group, with the designer of the "Avian," Mr. R. Chadwick, on the left.

The "Cirrus" Mark III engine is of the four-cylinder-in-line air-cooled type. The cylinders are of cast iron and the cylinder heads of an aluminium alloy, each cylinder head being fitted with two sparking plugs and one inlet and one exhaust valve. The overhead valves are operated by rocking levers actuated by push rods from tappets in the crankcase. The pistons are aluminium alloy castings and are each fitted with three cast iron rings. The gudgeon pins are hollow and are of the fully floating type, while the connecting rods are "Y" alloy forgings of "H" section.

The crankshaft is of solid construction and gives a direct drive to the airscrew; it is journalled in roller bearings at each end and further supported by three intermediate plain bearings at each end. The crankcase is constructed of aluminium alloy castings stiffened by three transverse webs, and housings are provided for camshaft and oil pump spindle bearings. The camshaft is supported by one ball, and three phosphor bronze, bearings. It is driven through the medium of steel gears housed in the crankcase and timing gear cover and is fitted with central spiral gear driving the oil pump spindle, and a tachometer drive at the rear end.

Ignition is provided by the B.T.H. magnetos, the forward one being fitted with an impulse starter while the one at the rear is spigot mounted. One Claudel Hobson H.R.C.H. carburetter is fitted in the engine.



The 85/96 h.p. "Cirrus" Mark III engine.

Lubrication is on the "wet sump" system, the oil being poured direct into the lower half of the crankcase, usually termed the oil base, which possesses a capacity of 12 pints of oil, sufficient for about five hours' flight. The oil pump is arranged at the lowest part of the base, so that it is always flooded or self-primed with oil. This pump forces the oil through a gauze filter arranged horizontally immediately above the pump, and thence through the main delivery pipe to the oil gallery arranged on the port side of the engine. The oil gallery is connected to passages cast in the top half of the crankcase, which run to the centre and intermediate bearings, the oil being thus forced under pressure direct to each bearing.

"Cirrus" engines are fitted in "Avro-Avian," Westland "Widgeon," Blackburn "Bluebird," Simmond's "Spartan," and Short "Mussel," British machines, and in numerous foreign aircraft. They have also been supplied to the Governments and air fighting services of many countries.

Another product of Cirrus Aero Engines Ltd., is the "Cirrus-Hermes." This engine is also of the four-cylinder-in-line air-cooled type and is rated at 105-115 h.p. It is similar to the standard "Cirrus" Mark III, but more attention has been paid to cleanness of design and accessibility of the working parts. All the oil pipes, with one exception, are fitted inside the crankcase, while the crankshaft is lubricated under pressure. When a machine is indulging in aerobatics the oil is trapped by a specially constructed oil tray.

The cylinders and cylinder heads are separate, great attention having been paid to the heads to ensure maximum cooling efficiency. The pistons, like those in the "Cirrus," are of aluminium alloy, while the connecting rods are of steel construction. A feature of the engine is that it can be fitted into a base of the same size as that required for the "Cirrus" Mark III. The engine passed the Air Ministry type test at the first attempt, as did the "Cirrus" Mark III.

The "Cirrus-Hermes" is the standard engine fitted in the Parnall "Elf," and the twin-engined "Cutty Sark" flying boat constructed by the well-known S. E. Saunders Ltd., of East Cowes. The engine may also be fitted in the Simmonds "Spartan" in place of the "Cirrus" Mark III, if increased performance is desired.

The standard "Cutty Sark" flying boat is a twin-engined light cabin machine and has been specially designed to enable it to be converted for use with either a single engine of high power, or three engines of 80 h.p.

Skyscraper Records

It would be interesting to know how many storeys a building must have in order to merit the name of a skyscraper. Buildings of more than ten storeys are now common and their height is not so awe-inspiring as it was when the earliest tall buildings were erected in New York and Chicago. Perhaps the best storey at which to draw the line is the twentieth, and in that case there are only 36 cities in the United States in which skyscrapers have been built.

The total number of skyscrapers in the States is 377, of which 188 are situated in New York; 65 have been built in Chicago and 22 are to be found in Philadelphia. At the present moment only 10 buildings in the country are more than 500 ft. in height. The tallest is the Woolworth building. The highest point of this building is 792 ft. above street level, and it has retained the distinction of being the world's tallest building for 16 years. Very soon the honour will belong to the Chrysler building, which will be 17 ft. higher, but both must eventually give way before the Bank of Manhattan building now under construction. This will reach the record height of 836 ft.

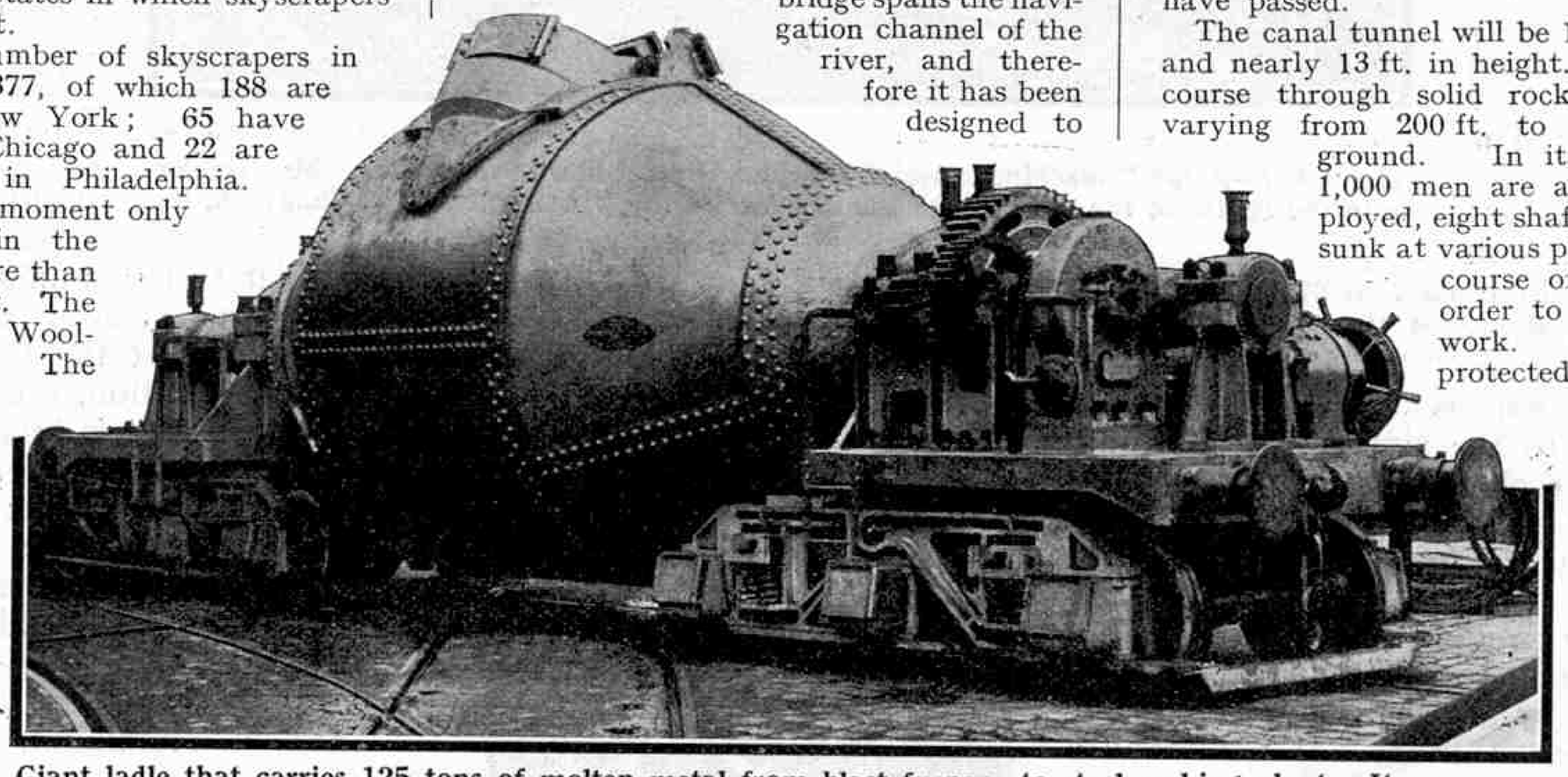
Even this great height does not represent the limit, for plans have been made for the erection of a building of 71 storeys to be known as the City Bank Farmers' Trust building, that would reach a height of 925 ft. There is also a prospect that an office building 1,000 ft. in height and possessing 80 storeys will eventually be erected on the site of the recently-demolished Waldorf-Astoria Hotel, at the junction of Fifth Avenue and Thirty-Fourth Street. This huge structure will accommodate 60,000 people, and the cost of its erection will be at least £15,000,000.

In its turn the Farmers' Trust Building will be exceeded in height when a skyscraper, 50 ft. taller is constructed on Broadway. This is to be erected with the deliberate intention of creating a record.

Two-Mile Bridge for Montreal

A new road and tramway bridge across the St. Lawrence River at Montreal, is now nearing completion. Including the City approach viaducts and an embankment on the south shore of the river, its total length is two miles.

The bridge is of cantilever construction, and the main span is 1,097 ft. in length, the two anchor arms each being 420 ft. in length. The central portion of the bridge spans the navigation channel of the river, and therefore it has been designed to have a vertical clearance above high water level of 162 ft.



Giant ladle that carries 125 tons of molten metal from blast furnace to steel-making plant. It was constructed by Pearson & Knowles Coal & Iron Co. Ltd., Warrington, and for permission to reproduce the illustration we are indebted to the courtesy of Sir W. G. Armstrong Whitworth (Engineers) Ltd.

Bangkok Memorial Road Bridge

Work is now in progress upon a new bridge across the River Chao Phya which flows through the middle of Bangkok, the capital city of Siam. The opening of the bridge will celebrate the 15th anniversary of the foundation of that city. The land required on the Bangkok side of the river belonged to H.M. the King of Siam, who has generously presented it to the city, and also has undertaken to defray one half of the total cost of the bridge.

The bridge consists of two approach spans, each 247 ft. in length, and a two-leaf bascule span giving a clear opening of 197 ft. Provision is made for a roadway 30 ft. in width and two footways each 8 ft. in width, and on either side of the bridge there will be approaches with ornamental gardens. The structure will contain approximately 1,100 tons of steel.

Underground Canal for Boston

An underground cana now being constructed in Massachusetts in the United States will be one of the largest of its kind in the world. When completed it will be 13 miles in length, and it is to be used to augment the water supply of Boston, Worcester and district. For this purpose it will carry each day to the Wachuset Reservoir the overflow from the Ware River after 85,000,000 gallons of water have passed.

The canal tunnel will be 11 ft. in width, and nearly 13 ft. in height. It follows a course through solid rock at a depth varying from 200 ft. to 650 ft. below ground. In its construction 1,000 men are at present employed, eight shafts having been sunk at various points along the course of the canal in order to speed up the work. The men are protected from the evil effects of fumes arising from blasting operations by a novel and efficient system of ventilation in which a draught of compressed air is used to drive foul air out of the tunnel. The debris produced in blasting is transported to the bottoms of the shafts by means of electric locomotives. Each of these is equipped with a storage battery of 48 cells, which are kept fully charged by means of automatic apparatus installed in each locomotive.

Later the canal will be extended in order to connect it with the Swift River, the valley of which eventually will be dammed and flooded. In preparation for this event a number of small towns that will be inundated already have been evacuated. The work will not be completed until 1937, and it is anticipated that no further increase in the water supply of Boston then will become necessary for more than 100 years. The estimated total cost is £20,000,000.

* * * *

An aluminium tram car, capable of attaining a speed of 45 m.p.h., was recently put into service at Pittsburgh, U.S.A.

Car That Carries Molten Metal

The engineering department of the Pearson & Knowles Coal and Iron Co. Ltd., Warrington, have built for the International Construction Co. Ltd., of London, a giant ladle or "hot metal mixing car" to be employed in the transport of molten metal. Although such mixing cars are in use in some of the large steel works in the United States, this is the first of the type to be constructed in Great Britain. Its purpose is to receive charges of molten metal from blast furnaces and to transfer them direct to the steel making plant.

The container is cylindrical in shape, and is 20 ft. in length, and 10 ft. 6 in. in diameter. It has a capacity of 125 tons of molten metal and its interior is lined throughout with brick. The ladle is supported on cast steel trunnions, the bearings for which are mounted on six-wheeled bogies, and it may be turned on its axis in order to enable molten metal to be poured in or out. The mechanism by means of which this is accomplished is driven by an electric motor that acts through suitable reduction gearing on a spur wheel mounted on one of the trunnions.

The overall length of the complete vehicle is about 40 ft., and its total weight is nearly 75 tons. The large diameter of the ladle necessitated special arrangements for its transport from Warrington to London, and the car was partially dismantled before being lifted on to special low loading trucks.

Giant Boiler Drums for Ford Works

The construction of the new Ford motor car works at Dagenham, Essex, is proceeding rapidly. It is interesting to note that the plant will include a number of high-pressure boiler drums that will be the largest yet made in Great Britain. These are now being constructed in Sheffield. They are being forged from immense hollow steel ingots, each of which is 45 ft. in length, and has an internal diameter of 4 ft. The thickness of their walls is about 5 in., and a single ingot weighs about 150 tons.

When ready for use the drums will undergo a series of exhaustive tests, in one of which they will be subjected to an internal pressure of 2,100 lb. per sq. in.

Liquefied Gas Drives Motor Car

Herr Max Valier, a German inventor, who has made interesting experiments with rocket-driven motor cars and sledges, is now turning his attention to the propulsion of cars on a similar principle, in which the rockets are replaced by cylinders of liquefied gas.

A rocket is driven forward by reaction from the backward rush of the gases developed on the combustion of its charge. Valier's idea is to use ready-prepared gases instead of producing them when required. For this purpose he mounts cylinders of liquefied gas at the back of the vehicle to be propelled. Each cylinder is fitted with a valve by means of which the escape of the gas may be controlled in exactly the same manner as the supply of combustible mixture to an internal combustion engine is controlled by the throttle.

A demonstration of the new principle was given by Valier on a stretch of road near Essen, Germany. A motor car chassis was fitted with three large cylinders of liquefied gas. When the valves were opened and the pressure thus released, the liquid changed rapidly into gas and this poured out with a deafening roar. The car shot forward and rapidly attained a speed of about forty miles an hour.

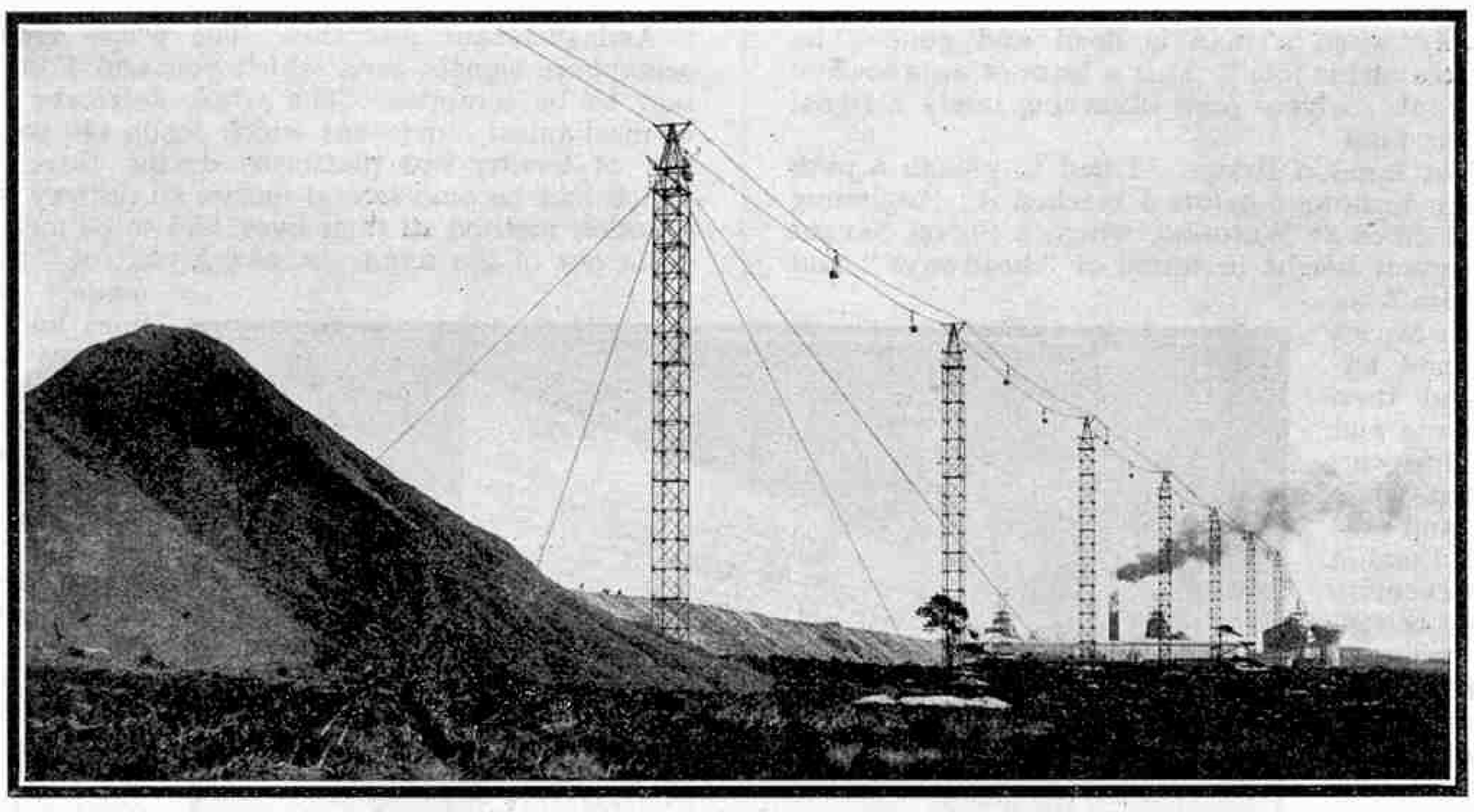
A Remarkable Wireless Receiving Station

Near Pittsburgh in the United States is one of the most remarkable wireless receiving stations in the world. It is a few miles distant from K.D.K.A., the well-known broadcasting station of the Westinghouse Electric Company, and also belongs to that firm. The receiving station is a small building, but it contains three of the finest short-wave receiving sets that may be built, and with these the operator may listen at will to programmes from stations in any part of the world.

Two of the three aerials that are connected with the sets are directional and receive signals coming only in one direction. The huge network of wire suspended from wooden poles that constitutes the larger of these is 300 ft. in length, by 80 ft. in width, and is some 60 ft. above the ground. Both are pointed along a line running from north-east to south-west and thus are favourably placed to receive signals across Newfoundland from England, Germany and Holland.

So well do these aerials carry out the intentions of their designers that signals from stations in Canada cannot be heard although these are much nearer than the short wave stations of Europe. The third aerial is of the vertical type and serves for the reception of signals from Commander Byrd's camp on the great ice barrier in the Antarctic.

When an all-Empire radio programme was broadcast in celebration of the recovery from illness of the King, the operators at the Westinghouse Electric Co.'s station listened in to it not from England, but from Australia. Before reaching the aerial connected to the second of the two sets the wireless waves travelled a distance of 13,500 miles to Australia, and a further 9,000 miles back to Pittsburgh, making a total of 22,500 miles, against the 3,500 miles of the direct route. It was found that the programme reaching Pittsburgh by way of Australia sounded like an echo to that received directly! The "echo" arrived only about one-ninth of a second later than the direct programme and was heard perfectly in spite of having an extra distance of more than 19,000 miles to cover.



This illustration of a White aerial ropeway employed at Clipstone Colliery (Notts.) for dumping waste material, will be of special interest in connection with the Meccano Ropeway described on page 44 in this issue.

Architect's drawing showing the appearance that will be presented when the bridge now under construction across the River Chao Phya at Bangkok, Siam, has been completed. The opening will celebrate the City's 150th Anniversary. For permission to reproduce this illustration we are indebted to the courtesy of Dorman, Long & Co. Ltd., who have secured the contract for the building of the bridge.

"A Signal Success"

By E. P. Leigh-Bennett

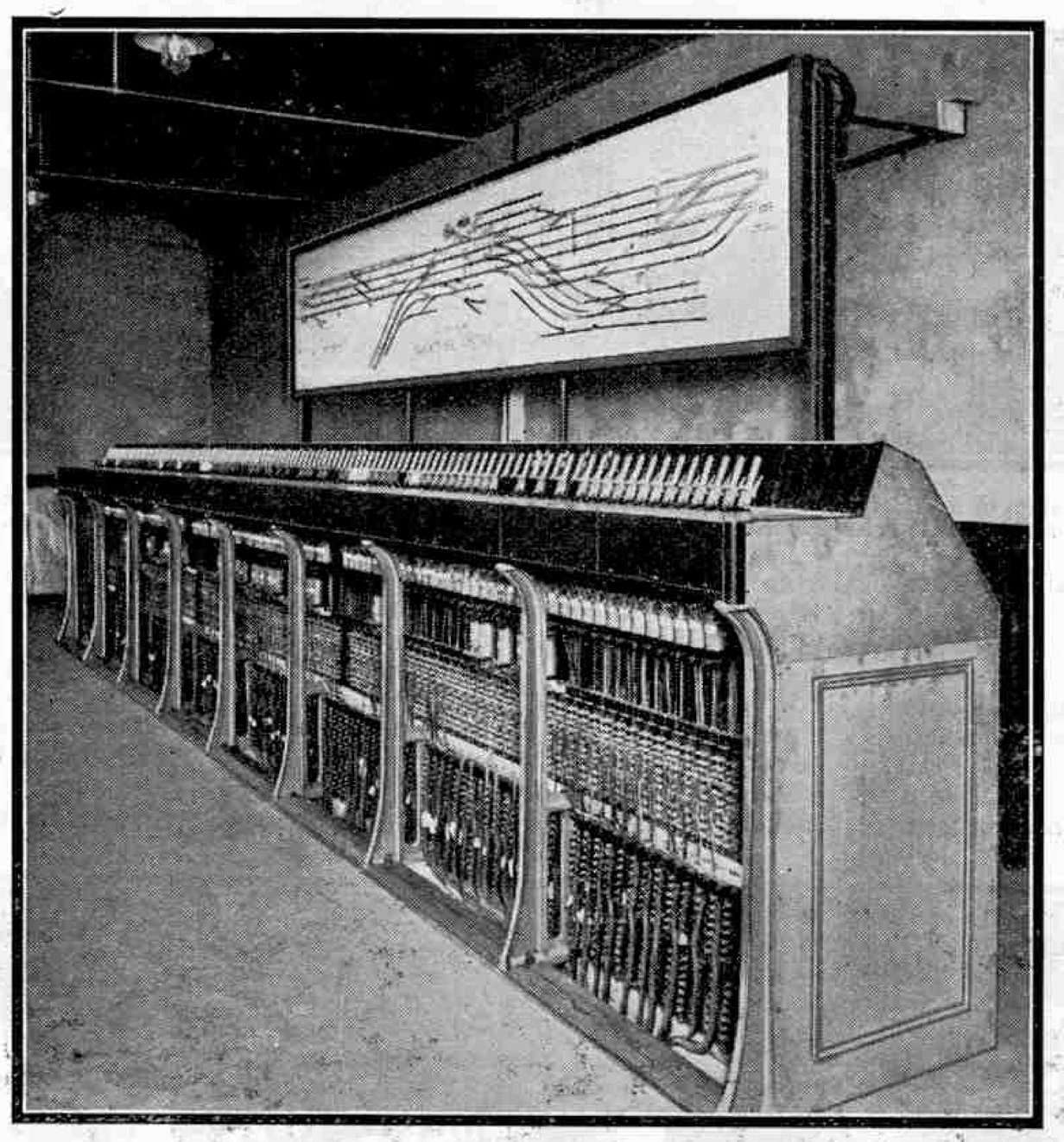
PEOPLE say—usually when a man is dead and gone—"he was a signal success at his job." It is a term of approbation used by the tolerant. I have been observing lately a signal success, but of another kind.

The scene was laid at London Bridge. I had to plough a path through a maze of high technique before I reached it; beginning in a terribly technical office at Waterloo, where a Signal Savant talked to me from a great height in terms of "headways" and the "semaphore system" as opposed to the "four-aspect arrangements for second advanced starting"—and then offered to come with me and explain some more. However, I slithered out of that while there was yet time, and was lost in the haze of London Bridge on a spring evening.

One hundred and thirty-five thousand people seem to be served daily by these London Bridge signals. But few of them are aware of the subtlety and at the same time the bland simplicity of the matter. The technicians had said that the traffic was "getting on top of them," and something must be done about it. You see, when you have to cope with an average of 440 passenger trains converging daily between 4 p.m. and 7 p.m. upon the same spot (not counting "empties," a few vagrant engines turning up from the country with the shame-faced look of spent hounds, and a palpitating posse of "excursions" pouring into the maelstrom from the Derby), only an iron discipline, a highly trained signal-shifting brain, a placid temperament, and a saving sense of humour can hope to cope successfully with the jig-saw puzzle of the points. They had all these things: had been brought up to them from boys. But it was not enough. Traffic, with the new electric services, was increasing continuously. The perpetual motion of the human avalanche was gathering a greater momentum—and with an ominous persistence. And then, as always when the limit of human and mechanical endurance seems to have been reached, the solution arrived. In this case the answer to the puzzle was the word "electricity," and it came from the Westinghouse Brake people.

I confess that my heart put in a couple of overtime beats of satisfaction when I heard that the greatest electrical system in the world was entirely and absolutely British. And that American railway brass-hats, sent over by their authorities to see it working, had stood in front of it and murmured "*Gee*"! and had shifted the unlit cigar from port to starboard in mute admiration of the job. I felt that we were one up again, since Segrave.

The two great virtues of electricity from the point of view of the railway traffic superintendent is that trains can be got off their marks at the platforms with a beautiful speed, and a conglomeration of signals can be worked with a minimum of effort and practically no anxiety. But good egg as all this seemed to be, it had to be installed without inconvenience to the avalanche—while it wasn't looking, so to speak. Otherwise there would be "some slight dislocation of normal service," a phrase which is the sweating nightmare of any Operating Department.



The power signal frame of the electrically-operated box at London Bridge. The number of levers is 311, and during the evening rush the signalmen at work in the box deal with an average of 440 passenger trains in three hours.

And it meant just this. The whole system of hand-worked semaphore signals here, which you and I know by sight so well, had to be scrapped. The whole intricate and vital machinery of mechanical movement which sends 440 passenger trains in and out of twenty-two platforms during three stressful hours, and which had become second nature to railway men who had known no other method all their lives, had to be forgotten—washed slate-clean out of the mind. A new layout of "the roads" had to be made. Many of the "Up" lines had perforce to become "Down" lines; because into this mental chaos had to be inserted (with, as it seemed to me as a layman, the deliberate purpose of further confusing the issue!) yet another electrified service, with all its lizard-like dartings in and out, replacing some of the ponderous and highly conservative steam traffic which did at least give a man a chance to turn round. In the place of this established order of things had to be fixed "in good running order" a vast new collection of signals of a totally different kind, worked in an entirely different way. And the 135,000 passengers (and there are six days in the week, remember) were not to be inconvenienced in the slightest while all this was being done. *Phew!* . . .

A Railway Company, like all good fighting Englishmen, has a great capacity for taking punishment and coming back smiling. But, like the fighter on the defensive who has always the gong to hope for, the Railway has always the week-end for breathing space, so far as its business traffic is concerned. And it is during the comparative siesta of the week-end that mechanical miracles can sometimes be worked. This signal metamorphosis was achieved during one week-end, stealthily, strenuously and successfully. One day the public, yawning out of window, saw with a disinterested eye what appeared to be a new Signal-Box being built outside London Bridge; but that to them meant nothing very much. What it meant to the Company, however, was months of schools of instruction for engine-men, firemen, motormen, guards, shunters, and the rest. An expenditure of a packet of money running into six figures. A breaking down of old traditions and the inculcation of new lore upon minds by no means plastic. Rehearsals in the dead of night with a volume of traffic which had to be imagined. And a final selection and training of the sixteen signalmen picked to work the new system, in the functioning of which there must be no failure. So they all worked, and taught, and listened, and learned, and said little, and thought the more, and cursed the contractors in throaty undertones—which is an Englishman's inherent privilege and relieves monotony—and did a little pungent grousing among themselves, but approached the week-end with that impenetrable calm which gets us through most of our bellicose and peaceful jobs in the end. The week-end came and brought a burning fiery furnace of anxiety for those in command. But it passed. Normal business service was resumed on Monday morning. The gargantuan job had been done.

The Signal-Box, in which repose the nerves and brains of London

Bridge's electrified body, is now a softly throbbing organism—a little kingdom of clicks. Electricity, which seems to have the power of making mechanical operations almost human, compels silence while men attend it. The god in the machine here makes little clicking sounds of quiet self-satisfaction as it functions. And six deferentially absorbed men move their fingers among 311 tiny levers (as opposed to the shoulder-heaving manuals the men have been accustomed to) in response to the dumb commands of the god's popping lights and flicking dials placed before their watching eyes. But no one speaks.

Of the sixteen chosen men there are six standing on shift at the moment: and of the eight carefully selected boys, there are three, sitting academically behind them on stools, writing down with meticulous obedience the god's decrees. With the tumult of trains snarling past the windows none of them has the faintest interest. They don't need to *see* their trains any longer: they would much rather not. The "five-five" Eastbourne express thunders through pullmanly plutocratic: but she might be a black-beetle for all the notice that is taken of her here. Her passage, however, appears upon the huge Indicator Board in section by section of signals as she reaches them, and thus is her passing recorded. A white disc turns black: she is there. A pause. Black transforms itself into white: she has gone. And so with all the heterogeny of trains; their movements are recorded by lights which wink through little holes in steel boards. Infallible is the testimony of their progress, because the trains themselves complete "contacts" on the line, which telegraph back, quicker than the human brain can think, to the god in the machine, who responds as quickly to his acolytes serving at the polished mahogany and brass signal-table below.

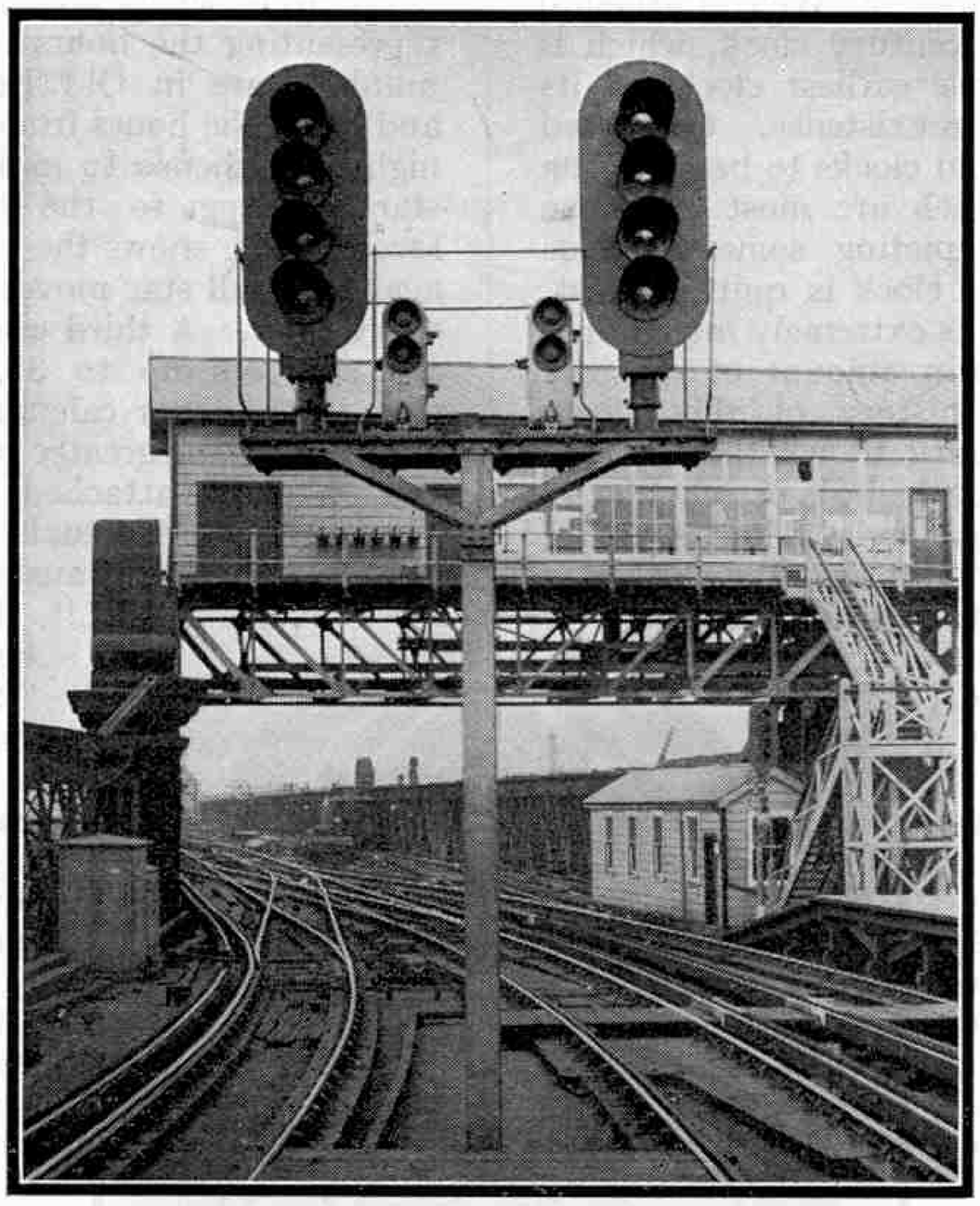
Technicians at my side explain *sotto voce* that it is all "foolproof." That electric locking-bars are adamantine in their repressive actions. That mistakes can result only in something going to "safety." I dare say. I can understand, too, the need for silence, and I observe it, because six good men are concentrated deeply on an important job, and are very properly lost to the fatuities of the world whilst so employed. It isn't that either which impresses me, because I have been in signal-boxes before, and so this atmosphere of calm, quick-thinking efficiency is not new to me.

But what I want to know is what happens when they get a "short": when one of these little eyes fails to wink its yellow, red or green orders; when one of the million and a quarter electrical "contacts" London Bridge makes each day fails to function. I think of the frailties of the lighting and starting set on my little two-seater, and I feel this is a fair question. Then they take me round behind the long signal-table, and I see that the innards of the mechanism are exposed in their entirety behind glass, so that cause of trouble can be diagnosed instantly. And then they take me down below, to the engine-room of the ship, as it were. Down here the nerves of the immense mechanical body are exposed nakedly for lynx-eyed inspection. Most of them are reposing on shelves in glass-fronted boxes with slate lids—there are only a thousand of these boxes, and they cost only £15 each! A little man in brown overalls moves about amongst them: the kind of man who makes you feel that it doesn't matter in the least what untoward event should happen, causing something to fail to do what it ought to do and has been doing quite nicely lately, because, whatever it is, he can, and will, instantly rectify it without undue effort and with complete *sang-froid*.

He walks with me down the alleyways of this vault of voltage, talking in the foreign language of electricity. But, *blasé* as he is, he simply cannot resist pausing before the showpiece of the place. A little glass-fronted box, looking to me just as snakily sinister as all the others; but apparently terribly cunning in its functions—a very Daniel of the dynamo. The overalled overlord disconnects some of its arteries and grafts others upon its black body with deft fingers.

"See? She's just beginning to energise."

A layman observes faint and wholly unintelligible stirrings within her; realises that a 400-ton train, going full out, speeds on or pauses petulantly, according to her yea or nay of movement down here. Says "*I see*," and doesn't; and moves on from enigma to electrical conundrum until he emerges again into the spring dusk; where his thoughts revert to that particular week-end when they did all this; while he was replacing divots on a southern golf course and thinking himself no end of a fellow.



A typical group of colour light signals at London Bridge Station. The bracket signals shown are two, four aspect running signals, and two small two aspect shunting signals. This photograph and the one on the previous page are reproduced by courtesy of the Southern Railway.

London Bridge all-electric signal-box handles over 2,000 trains a day, is 113 ft. long and 16 ft. wide, has three stories, and the "frame" is 65 ft. long, weighing 22 tons. It has enabled nine manual signal-boxes containing 727 mechanical levers to be dismantled, it controls 2½ miles of track, as well as all London Bridge station, and it cost, with the various installations of colour-light signals it controls, £150,000.

[We are indebted to the Southern Railway for permission to reprint this article from their Magazine.—Editor.]

"A Driver of Famous L.N.E.R. Expresses"

(*Continued from page 4*)

A large party of railway officials, reporters, and photographers assembled to cheer as the heavy express was drawn out of King's Cross Station by the famous "*Flying Fox*," No. 4475. On arrival at Newcastle, the train was given what amounted to a civic reception, in which Driver Pibworth and his fireman came in for their share of congratulation.

In the following year an even greater distinction fell to the veteran's share, for he was given the task of driving the engine No. 4472 "*Flying Scotsman*," with special corridor tender that made the first non-stop run from London to Edinburgh, a distance of 392¾ miles. This was on 1st May, 1928, and thus within the short period of little more than three years he took part in three of the most interesting locomotive experiments of recent times.

During the whole of his railway experience Mr. Pibworth was not involved in any serious accident. As already noted, his long and honorable career came to an end on 1st February, 1929, when he retired from the service of the L.N.E.R. Company, and went to live at Enborne, near Newbury. As he was only 65 years of age and had always enjoyed robust health, it was expected that he could look forward to a well-deserved long and pleasant sojourn in the country. Although his health was not too good his death on 16th September last came as a surprise.

All railway enthusiasts will regret to learn of the passing of this skilful and reliable driver, who was so closely associated with many historic episodes in railway history.

Mystery Photograph No. 13

December's puzzle picture proved one of the biggest teasers of the series, and it is very obvious that few of our readers have ever been entrusted with the carving of a Sunday joint, for if they had the "mystery of the bone-handled carving fork" would have quickly become an open secret.

The vast majority of competitors seemed to be firmly of opinion that our representative at the Jamboree had been given an opportunity to photograph Lord Baden-Powell's Kudu Horn; in fact, all types of horns were popular ideas, suggested solutions ranging from those of almost every horned animal in existence to gramophone horns!

Other interesting suggestions were an ear trumpet, a winkle drawn from its shell, aerodrome wind-direction indicator, a cork with the end of a corkscrew protruding, and a freak potato or carrot! For each of these the perpetrator can plead justification, but many entrants went hopelessly astray, and this month the list of suggestions almost constitutes a record. The successful competitor is M. Bird, 142, Oaktree Lane, Selly Oak, Birmingham, to whom an autographed copy of my new book "Wonders of Engineering" has been forwarded.

The Wells Cathedral Clock

Wonderful Workmanship of 14th Century Monk

ONE of the most notable among the many features of Wells Cathedral is the 14th century clock, which is certainly one of the earliest clocks of its type that are still in existence. Compared with some of the old clocks to be found on the Continent, which are most elaborate affairs, usually depicting some religious incident, the Wells clock is quite modest, but nevertheless it is extremely interesting.

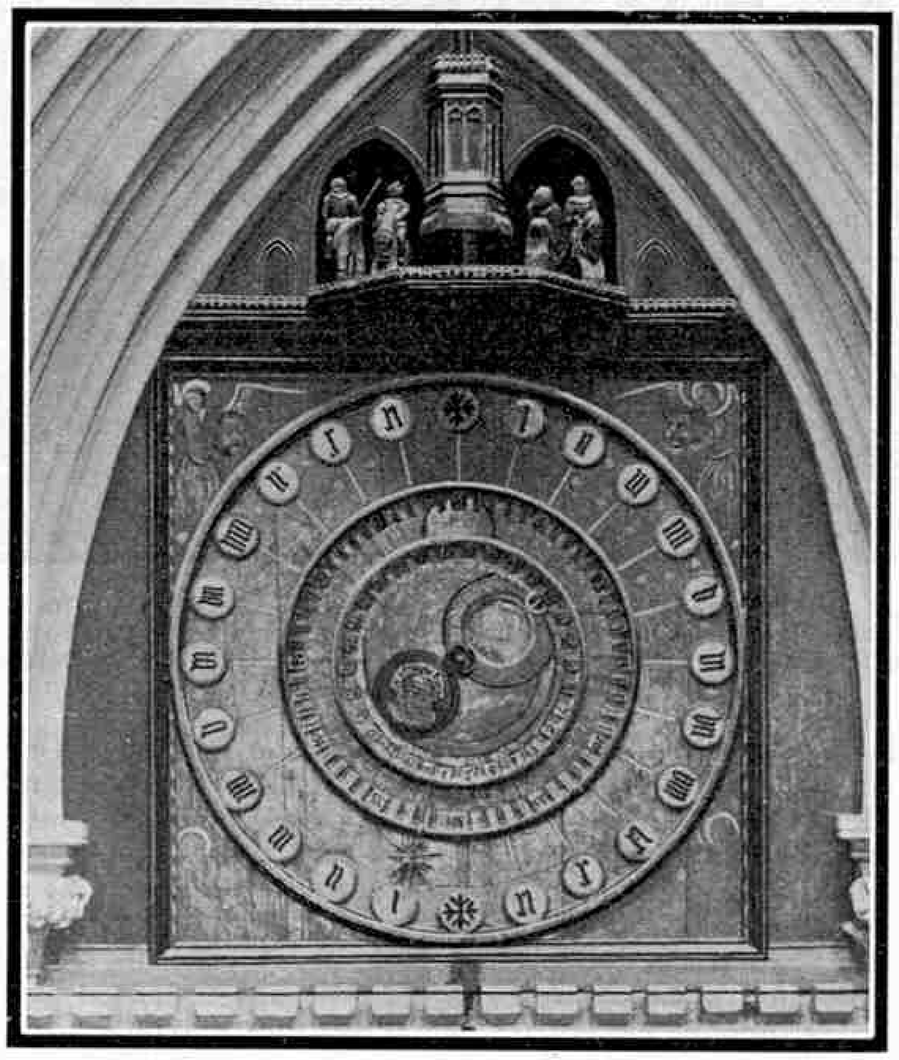
There is a certain amount of mystery about the early history of this clock, particularly in regard to whether it was always at Wells Cathedral, or whether it was originally at Glastonbury Abbey. The Cathedral authorities say that there is no doubt that the clock was built for the place it now occupies, and judging from its appearance this view seems quite justified. On the other hand there is a persistent tradition that the clock was originally in Glastonbury Abbey, and was set up in the north transept of Wells Cathedral after the dissolution of the Abbey in 1539. There appears to be no real authority for this tradition, and indeed it is known that there was a clock in the Church of Wells in much earlier times. In the Chapter records there is an item in the accounts from the year 1394-5, and continuously as far as existing rolls go, of "stipend to the keeper of the clock, 10/– per annum"—quite a large sum in those days.

It is an accepted fact that the clock was made by Peter Lightfoot, a monk at Glastonbury, and a possible explanation of the tradition may be that the works and case were constructed at the Abbey and for some reason or other were not actually delivered at Wells Cathedral until at a considerably later time.

Whatever may be the real facts of the matter, there is no doubt that Peter Lightfoot did his work exceedingly well. How well may be judged from the fact that the original works are to be seen working to-day at the patent office at South Kensington Museum, where they were placed in 1835, after doing duty for nearly five centuries! This is an astonishing length of life for such mechanism, and it is emphasised by the fact that the works that were fitted to the clock in replacement of the old ones had to be renewed again in 1880.

A good idea of the pattern of the clock may be obtained from the accompanying illustrations, but it should be said that the original colouring, blue and gilt, is faded.

The dial, which is contained in a square frame, measures 6 ft. 6 in. across the first or outer circle, which is divided into 24 parts representing the hours of the day. The numbers are in Old English characters and mark the hours from 12 noon to midnight and thence to midday, a large gilt star pointing to the hour. An inner second circle shows the minutes, and here again a small star moves round the circle every hour. A third circle, round which are numbers up to 30, represents the days in the lunar calender. A large disc plate covers the greater part of this circle, and on it are attached two other discs. The larger one is actually a ring, and it bears an inscription that may be translated roughly as "Of such doth the Universe consist." The smaller disc bears a female figure having round it the motto "Sic Peragrat Phoebe"—"So the Moon Revolves."



The interior of the Wells Cathedral Clock, showing the different circles of the dial. Above are the knights on horseback that circle the panelled tower at the stroke of each hour.

The arrangement of the companion disc and ring is extremely ingenious, for as the disc slowly revolves it reveals the exact phase of the Moon corresponding to the time indicated by the other portion of the clock. Beneath the disc there is a gilt surface that works in conjunction with a shutter arrangement. The shutter works inside the ring and is synchronised with the time indicated by the clock dials, and it opens sufficiently to indicate the phase through which the Moon is passing at the particular moment.

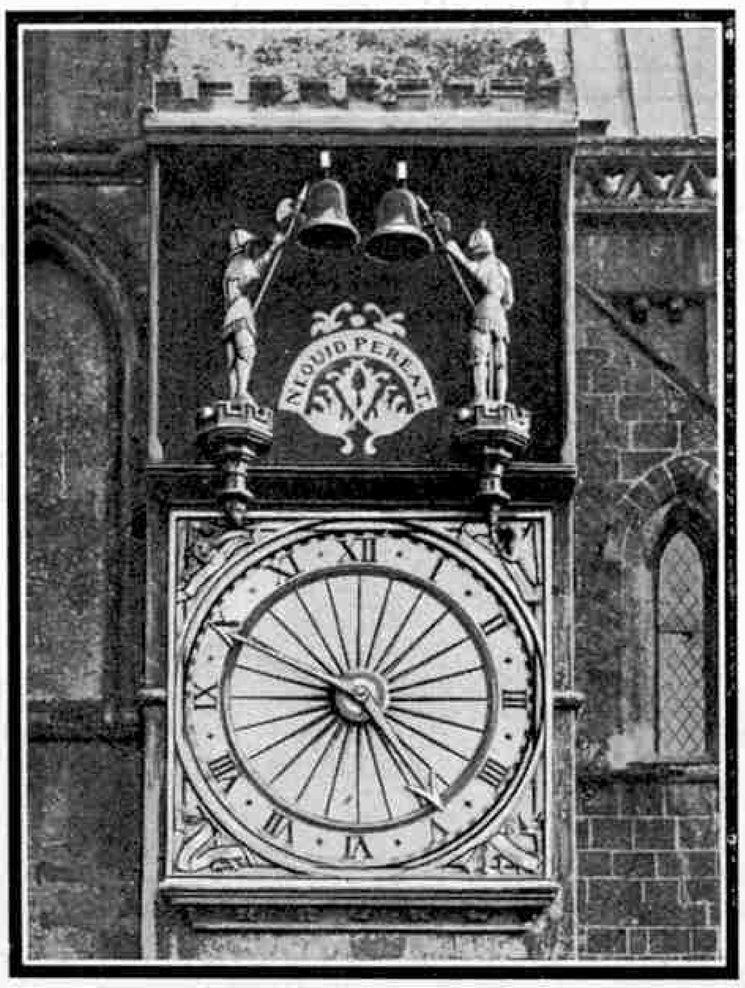
A modern clockmaker probably would have been satisfied to have accomplished so much, but Peter Lightfoot was not content. He wanted some more exciting occupation than watching his "Moon shutter" open and close, and so he constructed what is probably the most striking feature of the clock. In the Middle Ages the tournament was an extremely popular form of amusement, and Peter decided that he would add to his clock a model of a tournament.

We see a panelled tower and four knights on horseback. At the stroke of every hour two of the knights move in one direction and two in the other, circling the tower. As they pass, one knight with a thrust of his lance unseats his opponent, who falls with a resounding clash, but immediately rights himself. This mimic joust occurs once at 1 o'clock, twice at 2 o'clock, and so on. It would make quite an interesting problem to calculate the number of times the unfortunate knight has been thrown during the past 500 years. According to the verger the movement is stopped by the Cathedral

authorities during service on Sundays, and as this is the only rest the battle-scarred knight obtains, he probably appreciates the interval highly!

One authority declares that the present figures representing the tournament are not the originals, but clumsy substitutes, and one is inclined to accept this view. After all, the number of knocks our hero receives per day is about 150, and a few hundreds of years of this drastic treatment is not likely to leave the figures as spick and span as when they first took shape.

The tournament, however, does not complete the performance by any means. Some little distance away, in a niche, is a figure that is now painted in the period costume of Charles I. Jack Blandiver is his name, and his duty is to strike the quarters on bells with his heels—two strokes for the first quarter, four for the second, six for the third, and eight for the fourth. In addition he carries a hammer in each hand, and with these he strikes the hours. Outside the church, but still connected with the mechanism of the clock, are two knights in armour who also strike the quarters with battle-axes. For the convenience of passers-by an ordinary clock face appears below these figures.

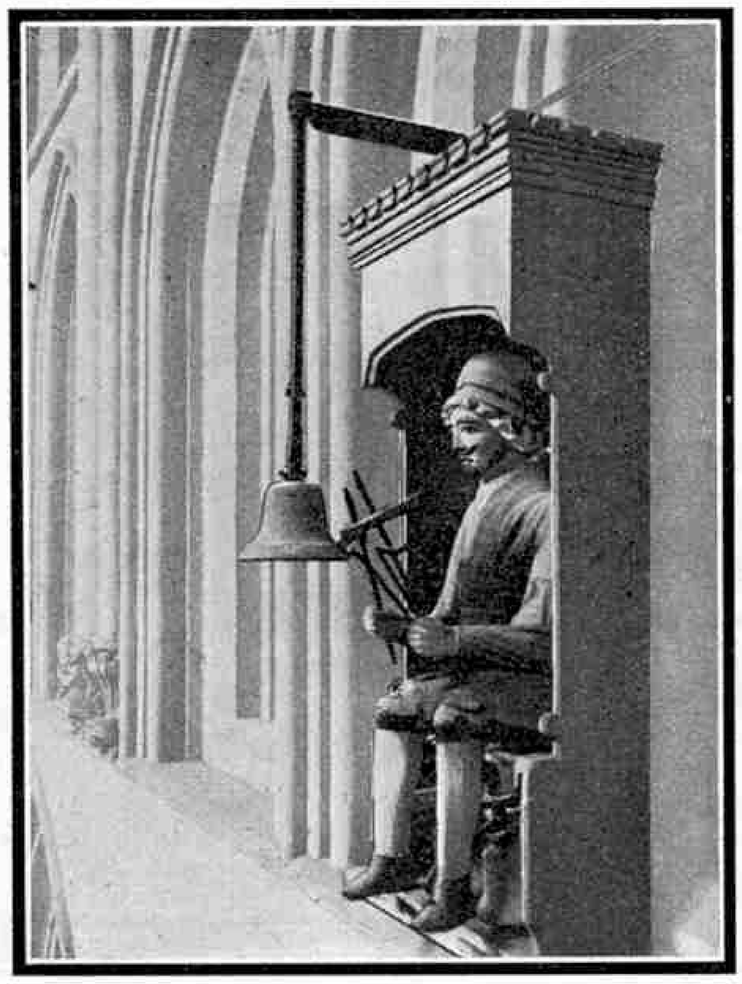


The exterior of the clock, showing two knights in armour who strike the quarters with battle-axes.

The original works of the clock are of iron, and are of a type very similar to those of a much later period. It seems remarkable that so many of the monks of Peter Lightfoot's day should have been able to turn out such wonderful models in their spare time. One wonders, indeed, whether some of them entered a monastery with the object of being able to work out their ideas without interference. At any rate it must be admitted that the work of these monks is a remarkable testimony to patient enterprise and triumph over difficulties by dogged perseverance and technical skill.

The city of Wells is said to have derived its name from some springs called St. Andrew's Wells which, in the Middle Ages, were believed to have certain curative properties. The existing cathedral was commenced about 1220 by Bishop Joceline, and the greater part of the building was completed before his death in 1244. The most remarkable feature about this splendid church is the wonderful series of sculptured figures that decorate the exterior of the west front, and which are the work of English sculptors of the later years of the 13th century. There are over 600 of these figures, a large proportion of them being life size and some as much as 8 ft. in height.

On the south side of the cathedral stands the Bishop's palace, and a very interesting spectacle is to be witnessed as one sits by the moat that surrounds this fine building. The swans on the moat have been taught to ring for food. A rope hangs down from the drawbridge, and the swans seize this and pull it, thereby ringing a bell. Almost immediately afterwards a door is opened and food is thrown down to them in the water. It is said that this custom has been handed down through many generations of swans, and whether this is so or not it is an exceedingly interesting little episode to watch.



"Jack Blandiver," who strikes the hours with hammers and the quarter-hours with his heels.

Although it is a far cry from Wells to Arabia, opportunity may be taken of referring briefly to another ancient clock dated 1358 and wrought in solid silver. It is one of the wonders of the Palace of Abu Hammou, Sultan of Flemcen in Arabia, and is described by the Abbe Barges, a noted French scholar. Above the beautiful painted case that contains the works is a model representing a thicket, above which a bird with outspread wings is shown protecting her young. A stealthily crawling serpent appears from its hiding place in an attempt to surprise and devour the young birds.

There are 10 doors in the clock front, each representing one of 10 hours of the night; and at the end of one hour the door that represents it creaks and shakes and from two larger doors above two eagles appear. Swooping downward, they settle on two copper vases into which each drops a piece of metal from its beak. These pass out of a hole in the bottom and return to their original positions, ready to be seized again by the eagles at the next hour. This movement would appear to be the forerunner of a similar operation by which type matrices are operated in the printer's linotype composing machines in newspaper offices.

The serpent has now crawled to the top of the thicket and, emitting a sharp hiss, it pounces on a young bird and bites it, the mother bird meanwhile endeavouring to defend her offspring by fluttering her wings and squeaking. At that moment the door that previously shook opens, and a female slave appears bearing in her right hand an open book upon which is a verse appropriate to that particular hour, while with her other hand she salutes the Khalifa.

It is impossible to say by whom and in what year wheel-clocks were invented, but there seems to be little doubt that they were used in the monasteries of Europe at least two centuries before the silver clock described above was made. Probably these early clocks had neither dials nor hands, but only struck a bell at certain hours to call the monks to prayer.

Subsequently many improvements were effected and during the 13th century wheel-clocks came into general use at European cathedrals, abbeys and wealthy monasteries.

Development of the British "Tank"

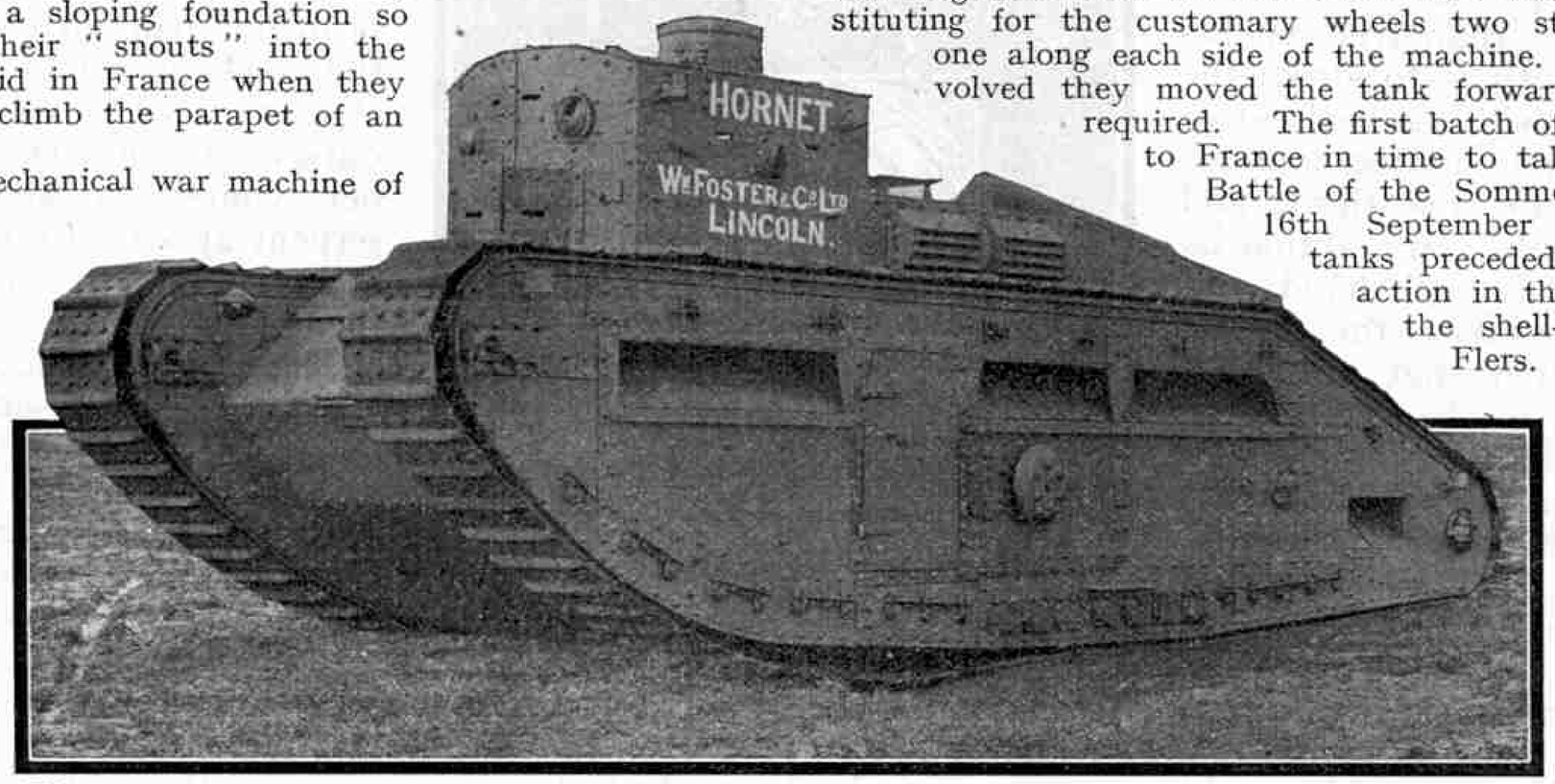
A Wonderful Wartime Invention

By G. W. Greenland

THERE must be very few *"M.M."* readers who have not seen at some time one of those weird war monsters, a tank.

At the end of the War many of these tanks were presented by the Government to towns that had done exceptionally well in raising money for the various War loans. The tanks were usually mounted on solid concrete bases as memorials, sometimes in parks, sometimes by the roadside, and often in specially railed-in enclosures. In many instances they were set on a sloping foundation so that they raised their "snouts" into the air just as they did in France when they were preparing to climb the parapet of an enemy trench.

The idea of a mechanical war machine of the tank nature is quite an old one. As far back as the 15th century a German military enthusiast produced a four-wheeled van equipped with guns, which was drawn by horses into a position in which it could do the maximum amount of damage. From that time onward various improvements upon this early machine were made, but all were very deficient in means of self-propulsion and were more or less tied down to existing roads. The British tank, which first appeared in action in 1916, was the first war machine to be entirely self-contained and able to traverse the roughest of ground.



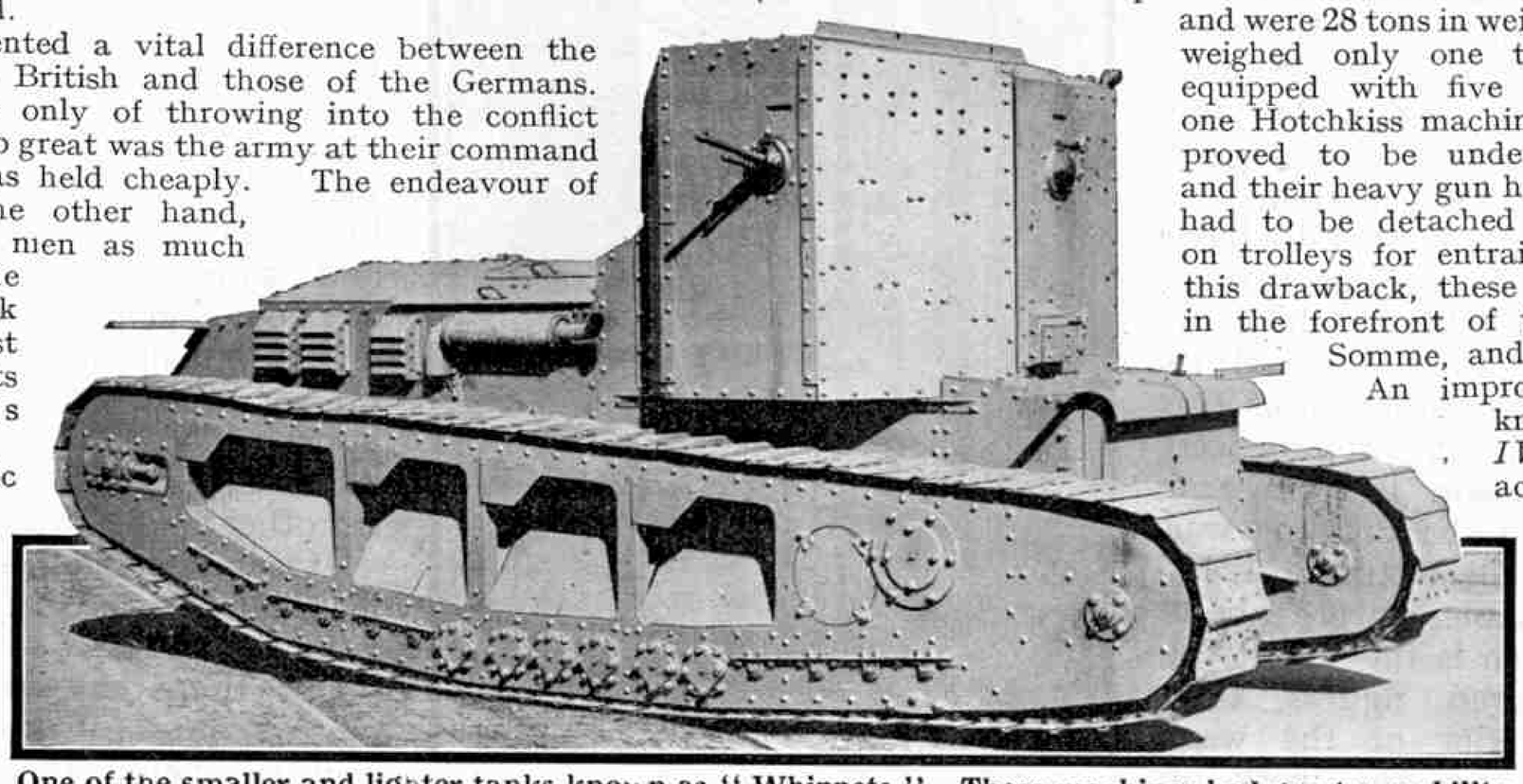
The latest type of tank produced during the War. The "*Hornet*" had a speed of nine miles per hour and carried a crew of five.

The tank represented a vital difference between the war tactics of the British and those of the Germans. The latter thought only of throwing into the conflict masses of men, for so great was the army at their command that human life was held cheaply. The endeavour of the British, on the other hand, was to economise men as much as possible, and the invention of the tank was one of the most successful efforts made in this direction.

After the terrific Battle of the Aisne in September, 1914, the deadlock of trench warfare set in. Trenches, barbed wire, and machine guns along each army's line brought about so complete a checkmate that neither army could advance against the other. The vital element of surprise was impossible, and this state of affairs was maintained until the summer of 1916. While the Allied military staffs were, at that time, preparing plans for the huge Somme attack, other engineering and military brains were evolving a machine of war that should be more formidable than the armoured cars then in use. These cars carried machine guns and crews and had accomplished good work; but on account of their heavy weight and mode of travel they could only be manœuvred satisfactorily on smooth and unobstructed ground. The intense research of inventors resulted in the evolution of the tank, a huge mechanical monster, provided with armour sufficiently thick to protect its crew, and capable of flattening barbed-wire barriers and of scaling the parapets of trenches.

The tanks' ability to break down or climb over obstructions and negotiate trenches and shell-holes was achieved by substituting for the customary wheels two strong endless belts, one along each side of the machine. As these belts revolved they moved the tank forward or backward, as required. The first batch of tanks was shipped to France in time to take part in the first Battle of the Somme in 1916, and on 16th September of that year 28 tanks preceded the infantry into action in the neighbourhood of the shell-stricken village of Flers. The tanks were huge, ungainly things, and nothing like them had ever been seen before. The first sight of them astonished the enemy, and amazement gave place to terror when it was seen that nothing could hinder the progress of the machines.

The tanks used were known as the "*Mark I*" class, and each was driven by a 105 h.p. Daimler sleeve valve engine, and moved at a speed of two miles an hour. The "Males" were equipped with two naval six-pounders and four Hotchkiss machine guns, and were 28 tons in weight. The "Females" weighed only one ton less, and were equipped with five machine guns and one Hotchkiss machine gun. The tanks proved to be under-engined, however, and their heavy gun housings, or sponsons, had to be detached and towed behind on trolleys for entraining. In spite of this drawback, these pioneer tanks were in the forefront of the fighting on the Somme, and at Arras in 1917.



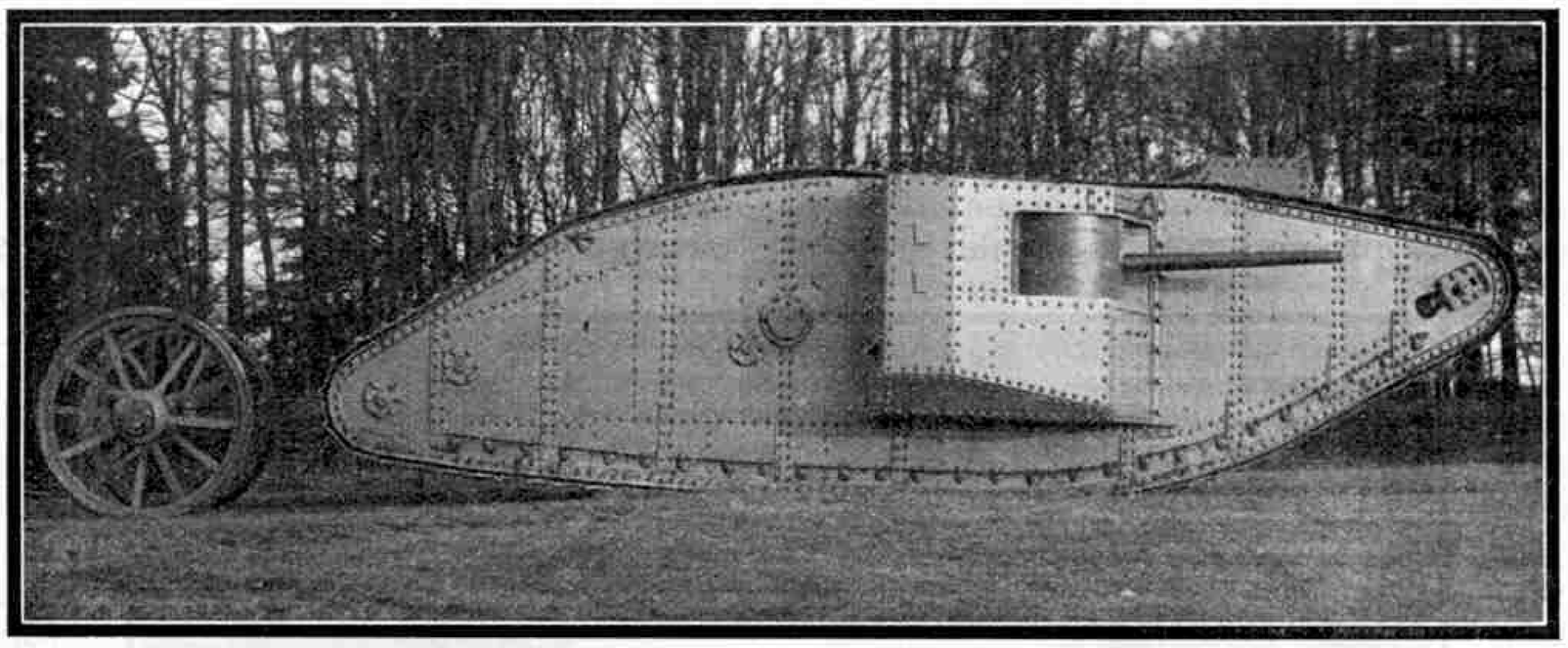
One of the smaller and lighter tanks known as "Whippets." These machines had greater mobility and could be manœuvred more speedily than the "heavies."

An improved type of tank known as the "*Mark IV*" class appeared in action for the first time at Messines in 1917. These had the same engine, but the sponsons were much smaller and could be pushed inside the vehicles when the tanks had to be transported by rail for service in some other sections of the war zone.

For all operations the tanks were entrained on trains of specially constructed double-bogie wagons. When a company had to embark its 12 tanks, the train was put in a siding at the end of which a ramp, or slope of timber and earth, had been built, sloping up to the height of the truck floors. The first machine was driven up the ramp with great care and gently worked on to the first truck. From this it wallowed on to the next, and

so on, until it had reached the very farthest truck of all, the twelfth. There it was scotched in place, and its engine shut off. The next tank was at the same time following suit, and eventually pulled up on the eleventh truck; and this process was repeated until the whole dozen were safely stowed.

There was only an inch or two to spare on each side between a tank and the truck sides, while sometimes a curve in the train further complicated matters. In addition, entraining was invariably done on pitch dark nights. No lights whatever were to be used for signalling by the officers outside to their drivers inside. Very frequently enemy aeroplanes were droning overhead, and to the throbbing of the mighty tank engines would be added the crashes of the bombs dropped by the raiders. It can easily be seen, therefore, that entraining tanks was an extremely difficult and nerve-racking business.



This illustration gives a good idea of the massive proportions of the "*Mark I*" tank.

Once the tanks were all aboard, a locomotive would be hitched to the train and away it would go to its next railhead, where the process of entraining would be reversed.

In the "*Mark IV*" machines pressure feed was used for the petrol, and the vital tanks were placed at the rear and heavily armoured. The "Male" tanks were 28 tons in weight and were equipped with two six-pounder and four Lewis guns; while the "Females," weighing 27 tons, had six Lewis guns. These machines, like the earlier class, proved to be underpowered and very slow to manœuvre. Four men were required to change gear and the tank could only be swung round on a very large circle.

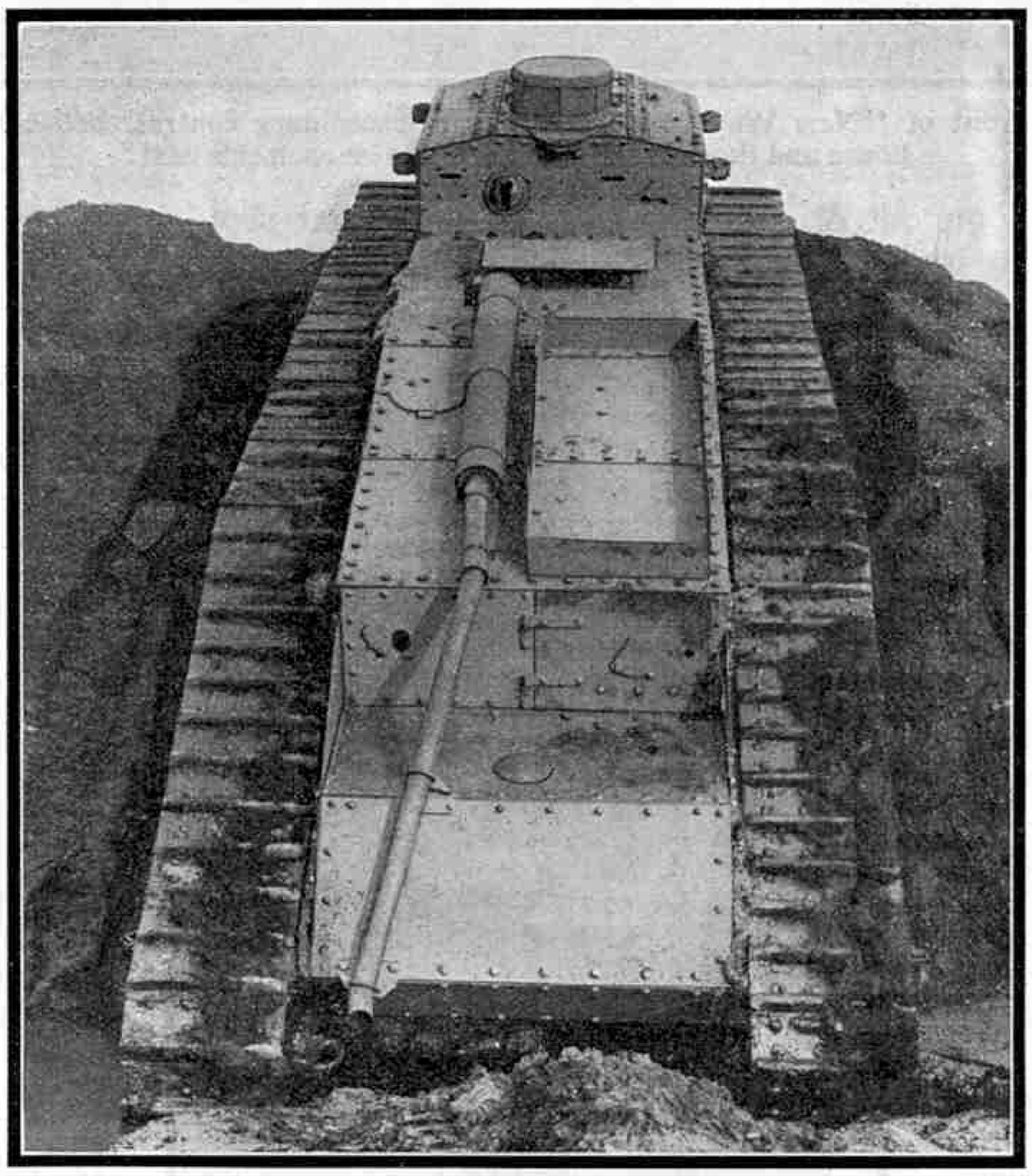
The "*Mark V*" class, issued in 1918, was a vast improvement. A specially designed Ricardo poppet valve engine of 150 h.p. was fitted, with one-man control. The armour was better, there were bigger doors at the stern, and the ventilation was greatly improved. So effective was the epicyclic gear that the tanks could swing round on their own axis, and in consequence they were very much more formidable in action. The armament remained unchanged, but they were a ton heavier than the "*Mark IV*" type, and had an average speed of five miles per hour.

A "*Mark V*" star was also built in 1918. This machine was 6 ft. greater in length, and could carry 20 men into action in addition to accommodating the necessary crew.

A very different type of tank was produced in the medium "*Mark A*." These tanks, which became known as "Whippets," were veritable destroyers as compared with the heavy tank battleships. They were 6 ft. shorter than the "heavies," weighed 14 tons, and had two 45 h.p. Tylor engines, each driving one track direct. Steering was done by means of a wheel, which closed the throttle on one side and opened it on the other, thus producing the turning movement by rotating one track faster than the other. The armament was four Hotchkiss guns and the crew consisted of only three men. The maximum speed was 8.3 m.p.h., and the average speed 5 m.p.h.

The latest type of tank produced during the War was the "*Hornet*," which was an enormous improvement on its predecessors, but never came into action. All-round fire was possible in this tank, in place of forward and flank fire in the previous "heavies." The crew was reduced to five, and ventilation was so improved that the internal temperature never rose more than ten degrees above that of the external atmosphere. This was a very important point, as in previous types the crews had always been exhausted by the great heat. The "*Hornet*" was tested for 1,000 miles and achieved a speed of 9 m.p.h. When the Armistice was signed orders for 6,000 of these tanks had been placed, but the orders were subsequently cancelled and only 36 of the machines were actually completed.

The great success of this wartime invention is reflected in the remarkable growth of the Royal Tank Corps and the steady increase in the number of tanks brought into service. The number of tanks launched on the Somme on 15th September, 1916, was 28. At Messines on 7th June, 1917, 40 went into action; while on 31st July, 1917, at the third Battle of Ypres, the number had risen to 144. On 20th November, 1917, at the epoch-making tank Battle of Cambrai, 350 of these machines attacked; while at the magnificent British attack at Amiens on 8th August, 1918—the first of our great hammer blows that finished the War—the number had reached 400.



A striking view of a "*Hornet*" climbing an enormous earth bank.

The tank was a most economical method of using man power. It had the greatest fire power per man of all arms, and it also gave the highest degree of protection to those operating it. This is proved by the fact that eight men in a wartime tank, working two six-pounder guns and three machine guns, had the same fighting power as 100 ordinary infantrymen armed with Lewis-guns, throwing bombs and rifles.

Tanks of the "*Hornet*" and "*Mark V*" types were used by the Royal Tank Corps after the Armistice, and when these became out of date they were replaced by a newly designed tank, the "*Vickers Medium.*" This became and still is the standard machine of the Corps.

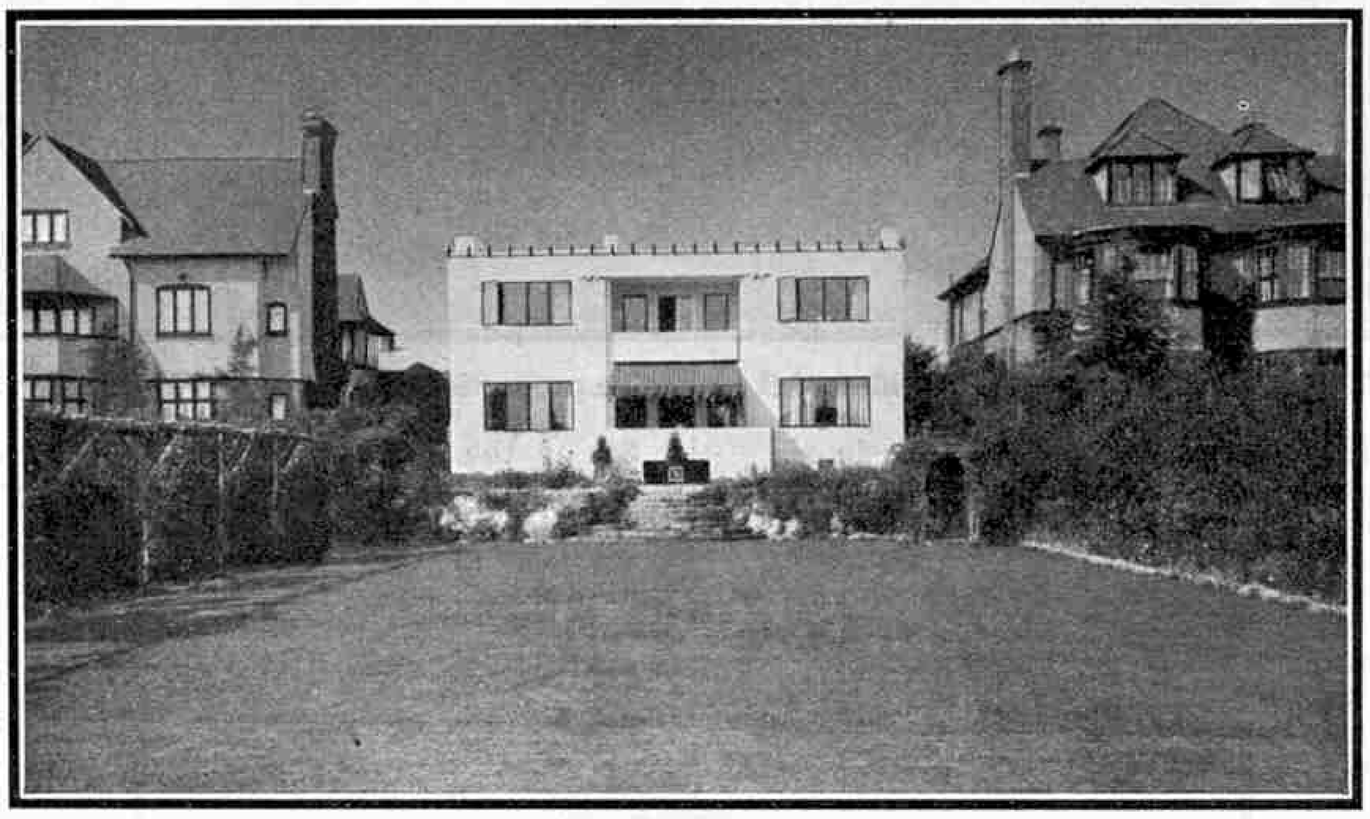
The "*Vickers Medium*" has a 90 h.p. air-cooled engine. Her low tracks are something like those of the old "Whippet," and she has an all-dominating circular turret that carries one three-pounder quick-firing gun and several light machine guns.

The most remarkable feature of the "*Vickers Medium*" is her speed, which across good country actually is from 20 to 25 m.p.h.; even over rough land she is able to travel at seven miles per hour. She has a trench-crossing capacity of 6 ft., and with full petrol and oil tanks has a "cruising radius" of 150 miles. Thus she represents the last word in military engineering and is a fitting successor to her wartime predecessors.

New Ways in House Planning

Securing Maximum Comfort and Efficiency

I HAVE often wondered what the average man or woman, travelling into Northampton on the Weston Road, thinks of a certain white concrete house. It is square and rather uncompromising, with a flat roof and a long triangular landing window reaching from a porch of unusual shape to the roof, and forming the only visible source of light to the top floor of the house. Certainly one may travel very far and not see another house like it, at any rate in England. I rather fancy that most people regard it as very strange, and therefore immediately decide not to like it. To English eyes this house is a little startling, and it certainly puts its ordinary and conventional neighbours out of countenance. At the same time its freshness and unusual straightforwardness of design make it very attractive to those who are prepared to accept new things and developments with an open mind.



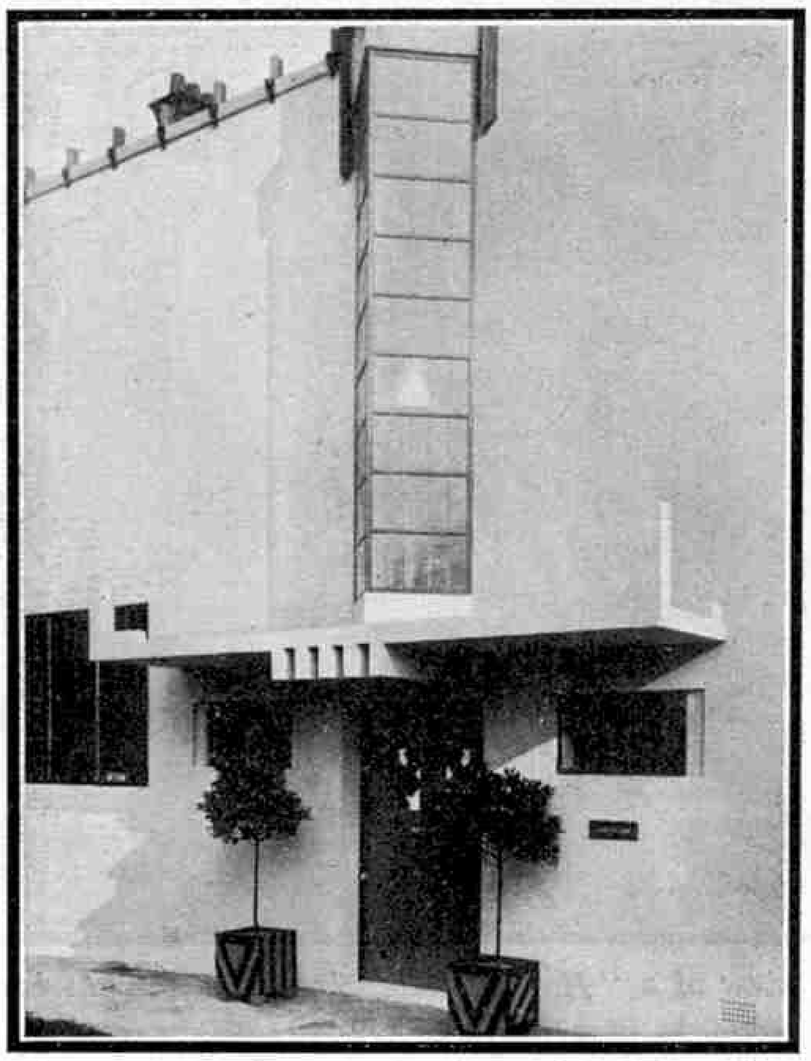
South front of "New Ways," showing the extraordinary contrast between this house and those of the orthodox type on each side of it.

I have been told that one builder always raises his hat when he passes the house. If other builders, and architects also, would do the same and carry their hat-raising into practice we might have fewer of those houses that specialise in "external features" of roughcast and imitation timbering and gables, no thought being given to the fact that some woman has to cope with the internal features and carry out her work against the handicap of their planlessness and general inconvenience.

This house is the residence of Mr. Bassett-Lowke, of the well-known firm of scale model builders. He has called his house "*New Ways*," and it is to be hoped that its new ways will soon become the ordinary ways of houses, so that when we go house-hunting we shall be able to find places to live in that are like our trains, ships and motor cars—efficient, easy to run, and equipped with all the latest improvements. It seems absurd to demand of all our machines that they shall be thoroughly efficient and involve the minimum of work, and at the same time tolerate in our houses conditions that inevitably make for much useless and entirely unnecessary labour.

Mr. Bassett-Lowke has been logical. He is dealing every day with models of ships and trains, and he has refused to live in a house that is stupidly planned and inefficient. He has built for himself a house that is probably unique in England, and when you step into "*New Ways*" you are entering a house in which modern invention and science have been adapted to the comfort and convenience of modern people.

The flat roof, so common now on the Continent, has been used partly from reasons of economy and partly because attics have been dispensed with, since they are usually unsuitable as bedrooms and only become places for the storage of useless lumber.



The north front, showing the interesting triangular window.

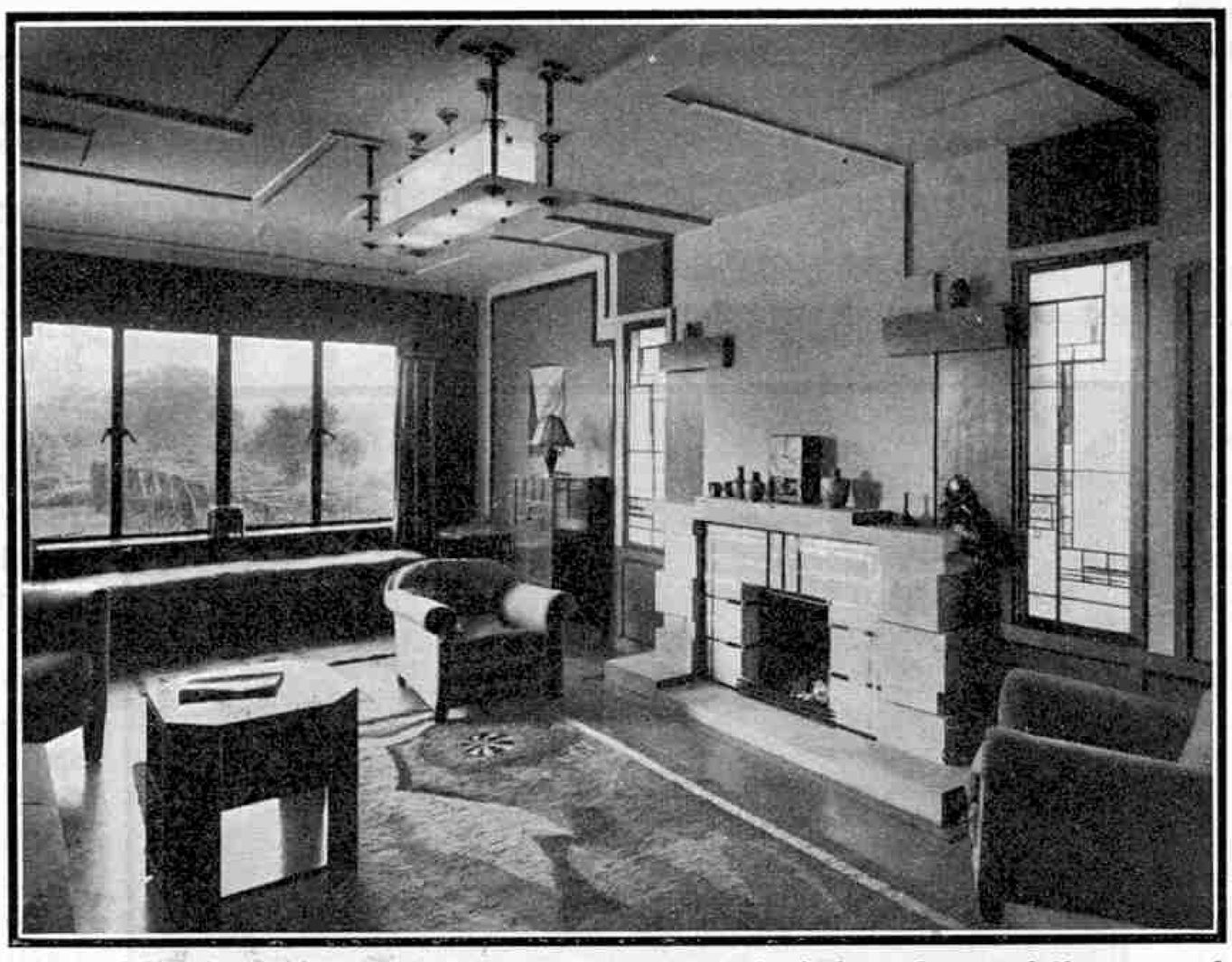
The roof is made of tongued and grooved floor boards coated with bitumen and then covered with a specially prepared roofing material. It is finally covered with gravel, which keeps the house cool in summer and preserves the bitumen from the sun.

The house is centrally heated, which is a necessary comfort in this erratic climate of ours. The rooms are all adequately ventilated, however, and there is none of the stuffiness and dryness that usually form a serious drawback to this form of heating. In the lounge there is an open fire, a concession to the Englishman's love of the open hearth, which no considerations of utility are likely to weaken.

The house is lighted entirely by electricity on a scheme so ingeniously contrived that the lighting is indirect and all glare is avoided. In the lounge the light comes through two long windows on each side of the fireplace, which also admit daylight

during the day. A triangular ceiling light with open top illuminates the room by reflected light. In the dining room the lights are placed between the ceiling and the floor of the room above, and also at the top of the pilasters that form such an interesting feature of the decoration of the room.

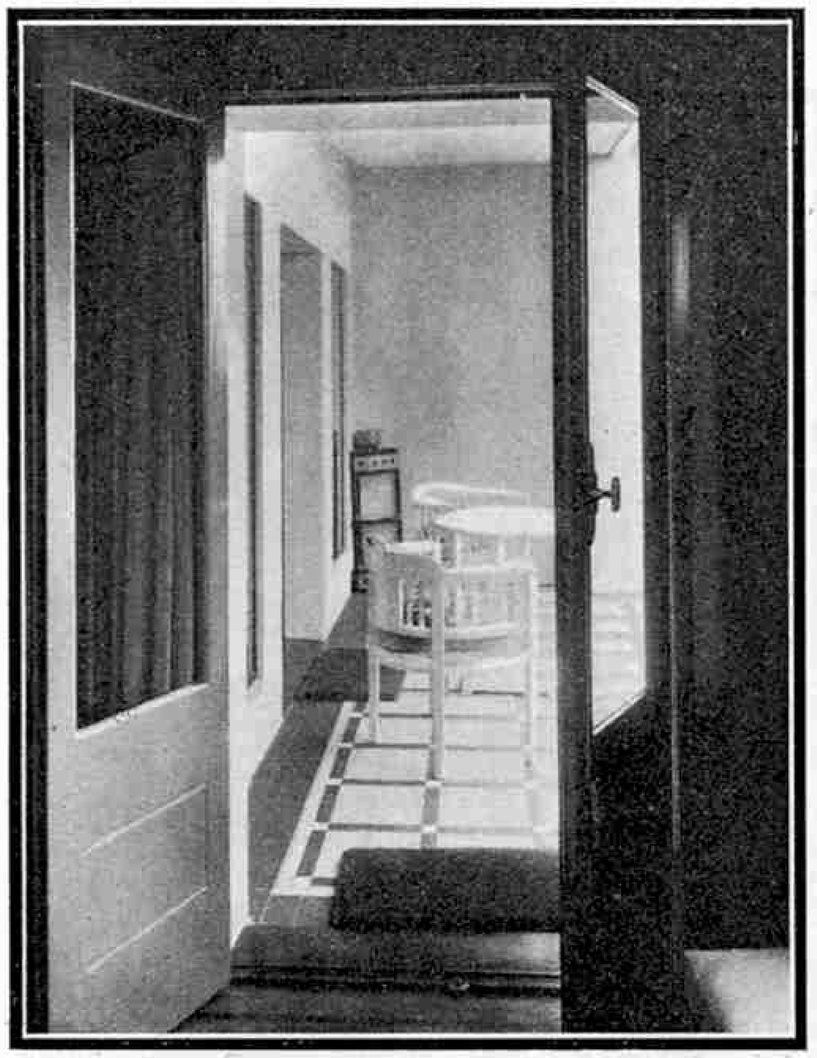
The windows in the front of the house are latticed, but those lighting the principal rooms are of plate glass with Crittall metal frames, with no wood to rot between the ironwork. The cement sills and the window ledges in the rooms are of coloured tiles. Anyone who knows the usual difficulty of keeping painted window ledges clean and uncracked by the sun will appreciate this convenience.



View of the lounge, showing the large expanse of window glass and the unusual type of ceiling light.

The staircase has no dust-catching balusters, their place being taken by solid brickwork capped with black polished wood. This, with the grey of the walls and the deep blue staircarpet, make a very attractive colour scheme. Throughout the house the walls and woodwork are of neutral tints. This allows more emphatic colours to be used in the furnishings, pictures and cushions, which can be altered without involving a wholesale redecoration.

The kitchen is an attractive, sunny room with an open view over the country, and it is very skilfully planned. There are no useless steps to be taken from the sink to the gas stove and dresser, and a service hatch communicates with the dining room from the hall and passage just outside the kitchen. It is interesting to find that cooking is done by gas and not by electricity, electricity having been tried and abandoned, not from the consideration of cost but because it was found that gas was more easy to regulate and was more efficient. The gas stove is of the latest type, which does not permit the gas fumes to come in contact with the food as the heating is indirect. A glazed screen above the stove collects the fumes from the burners and the smell of cooking and discharges them directly into the open air. A separate sitting room is provided for the maids so that the kitchen is wholly a workshop.



The covered loggia leading out of the lounge and the dining room and giving access to the garden through French windows.

A special point of interest is the independent wash-house beneath the kitchen, with hot, cold and soft water laid on. This arrangement enables all the operations of wash day to be carried on away from the ordinary work of the house, and as the wash-house is underground it is warmer in winter and cooler in summer than if it were in the form of a lean-to on the ground floor. The soft water is collected from the roof, not by outside down pipes that disfigure the house, but by earthenware pipes that are carried down the centre piers outside the verandah and then into a thousand gallon concrete tank built under the wash-house.

The two principal bedrooms each have separate bathrooms opening from them, and all the fittings are designed with the special object of economising labour in cleaning and keeping in order. The baths are American and are fitted into a tiled recess, so that there is no dust-trap beneath or behind them. All the fittings are of nickel, and each bathroom is fitted with a radiator combined with a heated towel rail. The servants' bedroom and the spare single room are fitted with hot and cold running water with a washing recess and fitted wardrobe.

Wireless is fitted in all the principal rooms, including the maids' sitting room.

"New Ways" may be summed up as a successful attempt to combine the maximum possible amount of light, ventilation and general comfort with the carefully planned simplicity that leads to ease and convenience of working. The houses of the past generation, and even a large proportion of those of the present, make entirely unnecessary demands upon the household staff in removing dust and dirt from awkward corners and crevices in fittings and furniture alike. There are no dust-catching crevices of this kind in *"New Ways,"* with the result that the rooms can be kept spotlessly clean with the minimum amount of labour.

The house of the future will undoubtedly develop on similar lines, with perhaps a greater mechanisation of kitchen operations. Further improvements are certain in regard to artificial lighting, in order to avoid the production of unwanted heat.

FROM OUR READERS

These pages are reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of general interest. These should be written neatly on one side of the paper only, and they may be accompanied by photographs or sketches for use as illustrations. Articles that are published will be paid for at our usual rates. Statements contained in articles submitted for these pages are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

Railway Wash-out in Rhodesia

The railway from Salisbury, Rhodesia, to Beira on the coast of Portuguese East Africa runs through difficult country and at one point crosses a large area that is only 20 ft. above sea-level. There the heavy rains experienced in the wet season may cause serious floods and these have been responsible for many breakages in the line and interruptions to traffic. Lately determined efforts to overcome this constant menace have been made and nearly £1,000,000 has been spent on viaducts, new bridges, and other works necessary to raise the line above flood level.

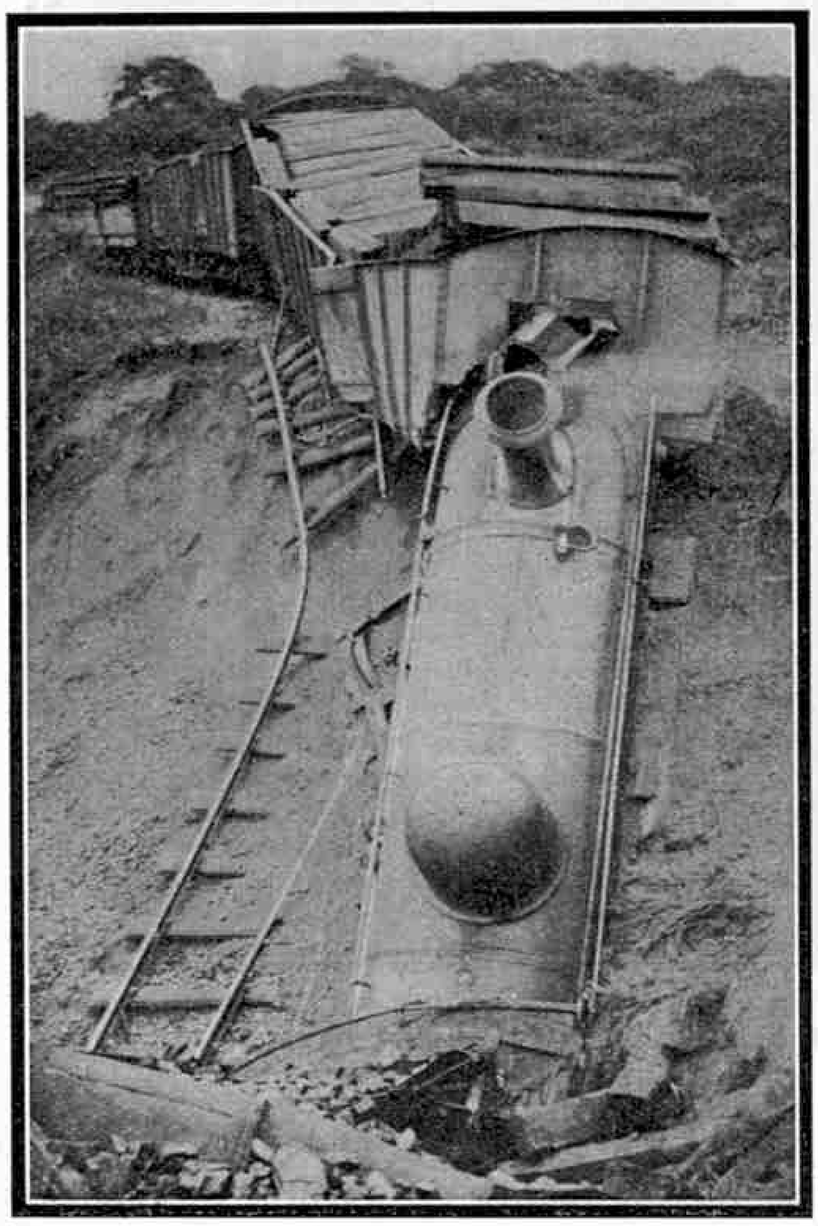
A railway disaster near Umtali, Rhodesia. The embankment that collapsed under the weight of the locomotive and tender shown in our photograph was undermined by flood water after heavy rain.

Some idea of the danger associated with the heavy rainfall may be obtained from the accompanying photographs, which show the tragic result of a wash-out on the line near Umtali. The wrecked engine shown was running tender first at the head of a train taking material and stores to a bridge gang engaged in replacing an old structure that had collapsed during the floods.

At the point where the collapse took place the line crosses a gully or "donga" by means of a bank. No train had run over the line for two weeks before the accident, and there was nothing to indicate that the bank was unsafe. It withstood the weight of the tender, but collapsed as soon as that of the engine was added. Unfortunately the driver and fireman were pinned under the wreckage and killed instantly.

Heavy rains in the previous week undoubtedly were the cause of the disaster. Water collecting in the gully above the bank had percolated through the material of which it is composed and had completely undermined it, thus making it incapable of supporting the weight that formerly it had carried in complete safety.

J. S. JONES (Umtali, Rhodesia).



Another view of the wreckage caused by the wash-out of the embankment near Umtali.

How Accumulators are Made

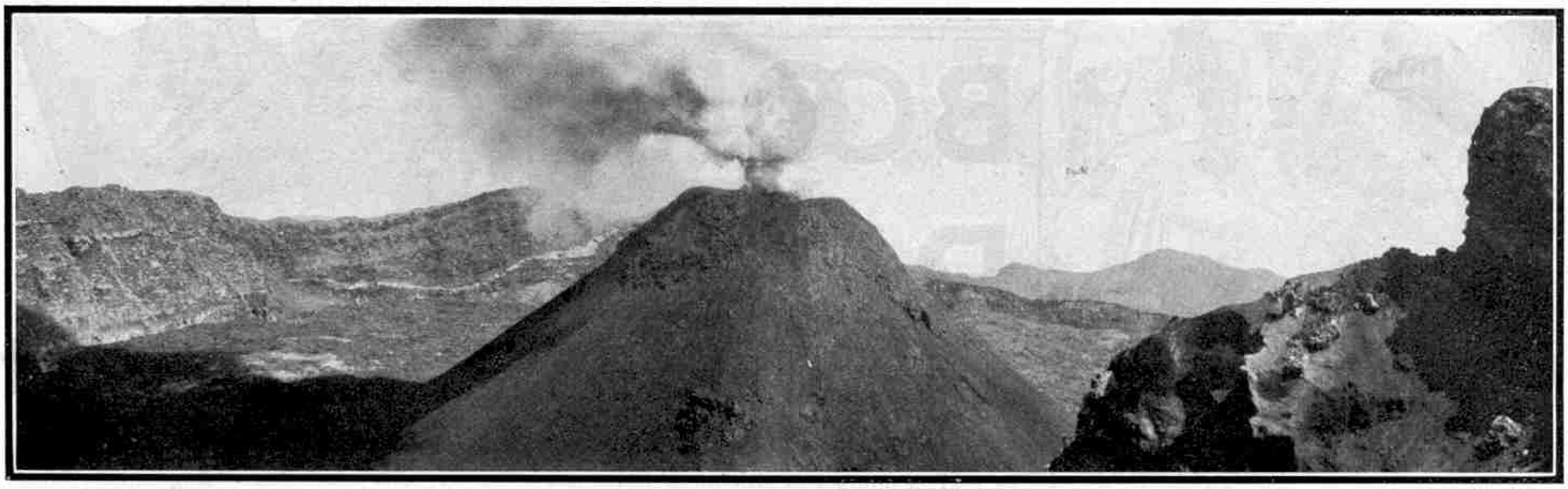
A short time ago I paid a visit to a factory in which accumulators are made. On arrival I was first shown how the plates are cast. An alloy of lead and antimony was melted in vats heated by oil furnaces, and the liquid poured into a mould, where it rapidly solidified in the form of a grid.

Workmen attired in rubber overalls, aprons, hats, and gloves then pressed paste into the openings in the lead grids. Those intended for use as positive plates were filled with a paste composed of red lead and sulphuric acid, but in making negative plates litharge was substituted for the red lead. The pastes are freshly mixed every 20 minutes, and great care must be taken during this process, for lead compounds are highly poisonous. After filling, the plates were submitted to a pressure of one ton per sq. in., in order to fix the paste firmly in the grids.

When the paste had been thoroughly dried the plates were "formed" by immersing them in dilute sulphuric acid in vats that hold as many as 5,000 plates. Positive and negative plates respectively were connected together, and an electric current passed through the acid from one set to the other. The red lead on the positive plates was oxidised into brown lead peroxide, while the litharge in the negative plates was reduced to a spongy mass of metallic lead.

In order to complete the formation of the plates the current was then reversed for some time, and finally it was passed through again in the original direction. It only remained to make the plates up into sets with specially prepared wooden separators between them and to fit them with terminals, after which they were sealed into glass or celluloid cases.

D. J. T. EVANS (Loughton, Essex).



A wonderful panoramic view of the interior of the crater of Vesuvius, showing the active cone in the midst of the waste of lava. Two days after this photograph was taken the volcano burst into violent eruption, and the outflow of molten lava caused much damage.

Ascending a Volcano

During a tour abroad I had the wonderful experience of ascending Mount Vesuvius and of seeing it in eruption. On leaving Naples a journey of 16 minutes on the Circumvesuviana Electric Railway brought me to Pugliano, where I changed to the line that ascends the slopes of the volcano. As far as the generating station the ascent was gradual and was made in a single-decker electric tramcar of the ordinary type. The line runs through vineyards, orchards and gardens, and from it wonderful views of the Bay of Naples are obtained.

At the generating station the line becomes very steep and the tramcar in which I travelled was pushed up by a locomotive with geared wheels that engage with a rack rail. Presently the car entered a second section of easy gradient, and after passing the Observatory and traversing enormous fields of lava, I arrived at the foot of the funicular or cable railway by means of which the last portion of the ascent is made. In the car on this railway I ascended 900 yards in 10 minutes. This took me to a height of nearly 4,000 ft. above sea-level, and the panorama of the Bay of Naples that was spread out below me was magnificent beyond expression.

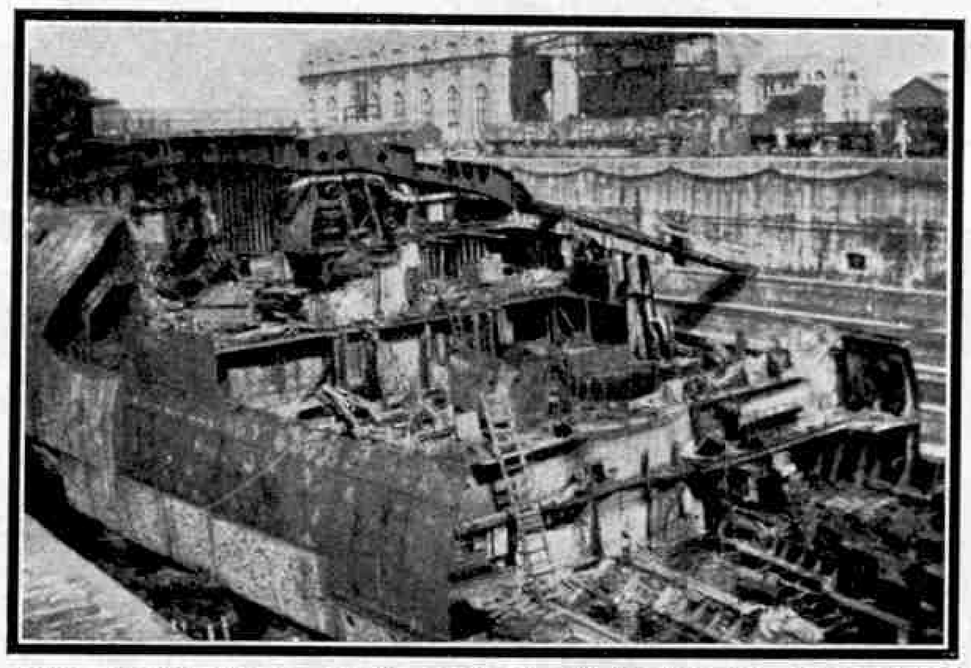
A walk along a gently rising footpath brought me to the edge of the great crater itself. Not 50 yards away from the spot where I stood I could see an enormous cone from which smoke and flames were rising. At frequent intervals the muffled roar of a subterranean explosion was heard, and showers of hot ashes were belched forth. This was the only sign of activity within the crater, the bare surface of solidified lava giving to the volcano a very desolate appearance. I had my camera with me, and obtained wonderful photographs of the remarkable scene.

Two days after my visit Vesuvius broke out into more violent eruption, and the streams of red hot lava poured out caused a considerable amount of damage in the surrounding countryside. Fortunately eruptions of Vesuvius on a large scale are now comparatively rare.

H. A. SEAL (London, N.1).

Visit to Rosyth Naval Base

During my Summer Holidays I received permission to visit the Naval Dockyard at Rosyth. I reached the dock gates by tramcar from the historic city of Dunfermline, and was interested to learn that a field near the tramcar terminus formerly was the site of an enormous number of huts, in which the workers at the base were housed. At that time nearly 6,000 people were employed in the dockyard, but to-day the number has been reduced to 500, and only one hut remains standing where once there was quite a thriving little city.



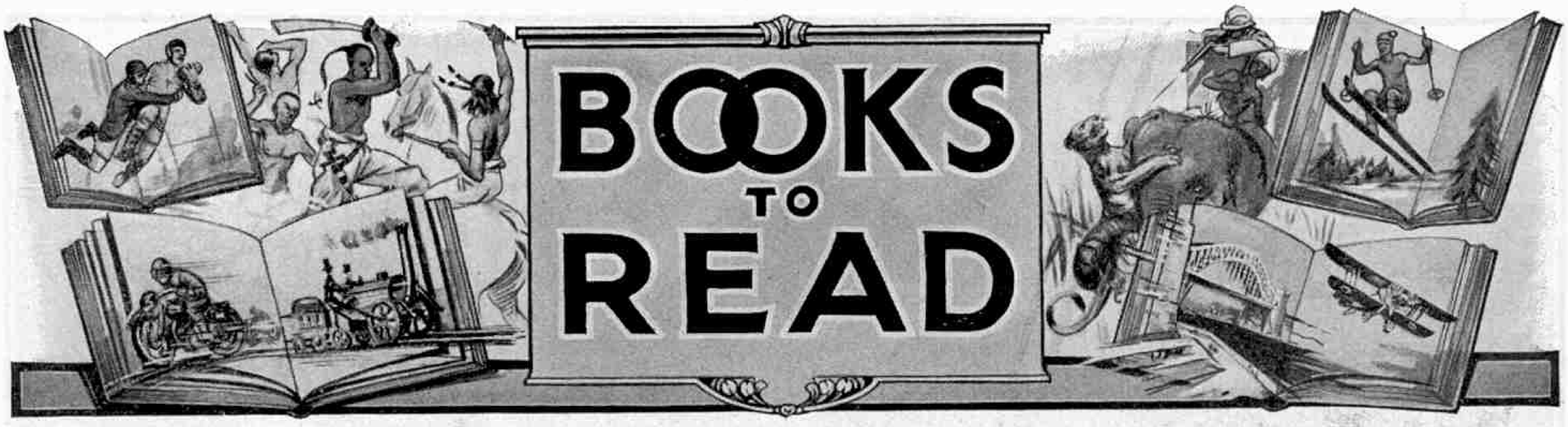
The ex-German battle-cruiser "*Moltke*" undergoing demolition in the dockyard at Rosyth.

To inspect the base thoroughly would require several days, and as I was chiefly interested in the work being carried on with the salvaged German war ships, I visited the dry docks in which these were being dismantled. I secured two interesting photographs of the battleship "*Kaiser*" and the battle cruiser "*Moltke.*" At the time of my visit work on the former had not yet commenced, and it lay upside down on the floor of the dock. As the photograph that I secured shows, the "*Moltke*" is rapidly disappearing. I was interested to notice the bath and the radiators still to be seen in this vessel, and I picked up a knife and a fork marked with the crest of the vessel. These are interesting souvenirs, but their stay of eleven years at the bottom of the anchorage at Scapa Flow has left them a little rusty.

Leaving the docks in which the ex-German vessels were being dismantled, I made a rapid tour of other sections of the base. I noticed scores of trucks full of metal waiting to be taken to the scrap merchants. In addition, I was fortunate in seeing a number of destroyers, these including the "*Trusty,*" "*Seabear,*" "*Sparrowhawk,*" "*Sturdy,*" and "*Scimitar.*" A submarine and a floating dock also attracted my attention, and I was shown several torpedoes in what is called "the torpedo dump house."

Finally I visited the immense power station, an inspection of the dynamos bringing an interesting day to a close. I was very tired but delighted with my wonderful visit.

W. MCARTHUR (Alva).



On these pages we review books that are both of interest and of use to readers of the "M.M." We have made arrangements to supply copies of any of these books where readers find difficulty in obtaining them through the usual channels.

Orders should be addressed to the Book Dept., Meccano Limited, Old Swan, Liverpool, and 1/- should be added to the published price of the book to cover the cost of postage. The balance remaining will be refunded when the book is sent, as postages on different books vary according to the weight and destination.

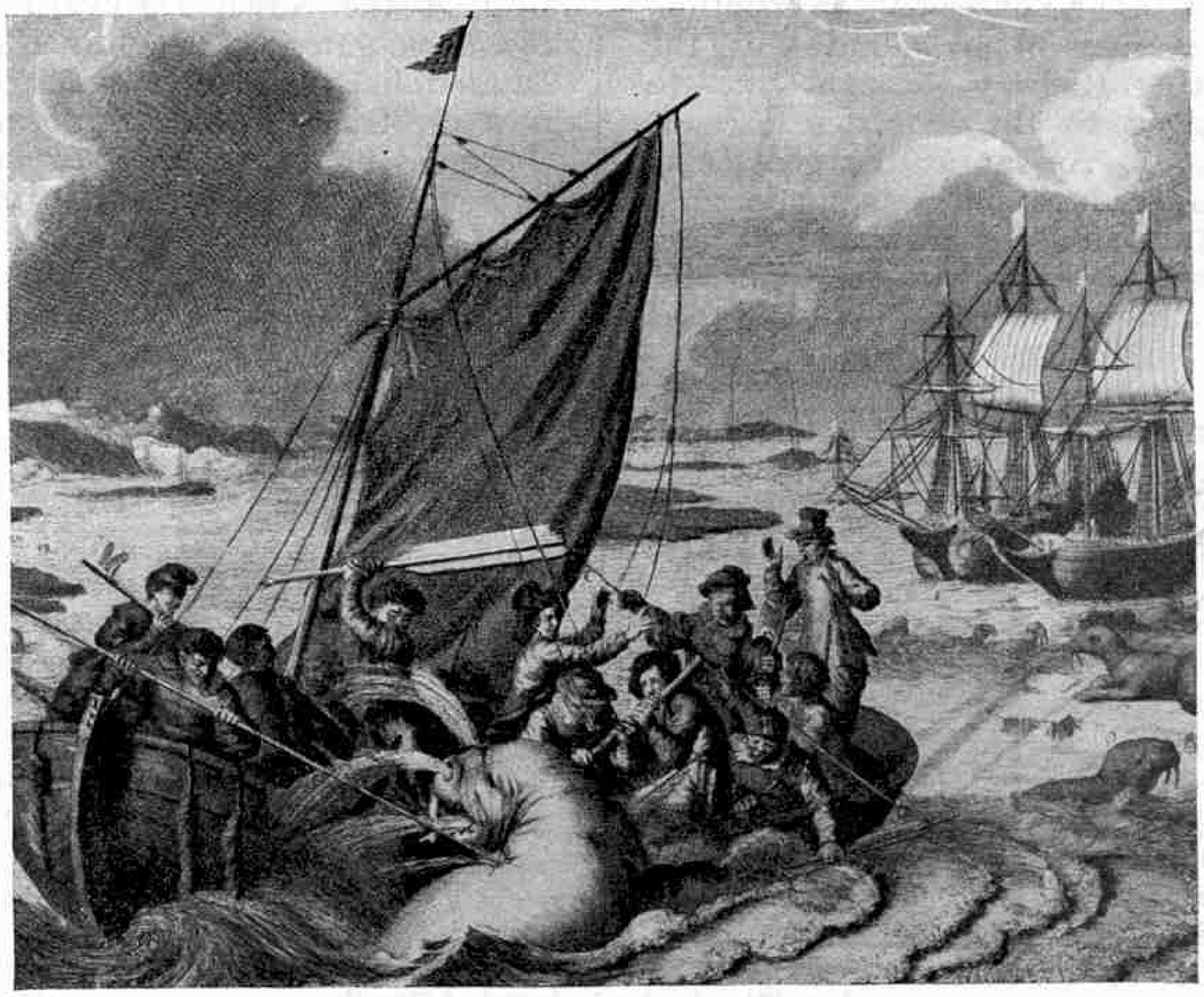
"On the High Seas"

By
Commander KEBLE CHATTERTON
(Philip Allan. 10/6)

In this his latest book, Keble Chatterton, already well-known as a writer of sea stories, gives us a thrilling collection of yarns concerning ships, men, and the sea. These stories have been brought together for the entertainment of those who find that there is no fascination to compare with maritime adventure—even when experienced only in the comfort of an armchair! Despite the fact that we find in these pages all the thrill and suspense, all the charm and daring of imaginative fiction, we are assured that every episode is true and every character in the book has actually lived.

The stories range from incredible stories of escape and adventure on the high seas to mutiny, exploration, slavers, and pirates. The episodes take place both in times of peace and war, covering a period that begins with the dawn of the 17th century and finishes with some of the little known sea episodes that happened during the Great War. Some of the details have been obtained at first hand and have not been published before.

The characters move across the stage in kaleidoscopic review and at times we are left almost breathless with the magical thrill of Mr. Chatterton's pen. We can recommend the book as being one that will thrill any "*M.M.*" reader from the first to the last—even those who are not particularly interested in ships and sailors will find it good reading.



Whaling and sealing in the 16th century. One of the illustrations in "On the High Seas" reviewed on this page.

"The Story of the Baltimore and Ohio Railroad. 1827-1927"

By E. HUNGERFORD
(Putnam's. 2 vols. £2 12s. 6d.)

We have just had the pleasure of seeing a copy of this remarkably attractive book, which deals in a very thorough manner with the development of a great railway. In 1827, a number of citizens of Baltimore demanded a charter for a railway from the State of Maryland, and ten years later a deputation was sent to England to obtain advice from those who had experience in the construction of railways. In America, as was the case in England, there was a long struggle between rival canal and railroad interests but, after the deputation's visit to England, the railroad carried the day. It is interesting to find that many of the early difficulties of the Baltimore Railroad were overcome through the good services of a Quaker—Philip E. Thomas—who persuaded doubters exactly as another Quaker, Edward Pease, overcame opposition to the Stockton and Darlington Railway.

At first, locomotives were imported to America from England, but as these were stated to be unsatisfactory the Americans began to construct their own. There was also a good deal of feeling against the English engines, but no doubt some of this feeling was due to prejudice. It was proved that a fixed wheelbase of little more than gauge width was unsatisfactory in America, and there were other reasons why the English locomotives were not a permanent success. In 1833 Robert Stephenson wrote, in reference to America's objections to his locomotives, that he was "sorry that the feeling in the United States in favour of light railways is so general, as in England every succeeding railway is being made stronger and more substantial—small engines are losing ground, and large ones are daily demonstrating that powerful engines are the most economical." The author clearly shows, in an interesting discussion, that after costly experimenting, the Baltimore and Ohio company subsequently succumbed to the fundamental ideas of English designers.

It is interesting to think that whereas in these early days America learned from us much of value in connection with early railways, she taught us many valuable lessons towards the end of last century. Now, in the twentieth century, the pendulum swings again and it is admitted that the Great Western Railway "*King George V*" has had considerable influence on the latest design of the Baltimore and Ohio locomotives. This famous engine, our readers will remember, was sent to the Centenary Exhibition, and the reception that it was given there shows that the respective countries can still learn from each other.

Naturally, so comprehensive a book contains much of technical interest, especially in regard to difficult problems of bridge construction, locomotive controversies and gauge conversion difficulties. Now that the Baltimore and Ohio Railroad has slipped across the threshold of the second century of its existence, one wonders what the second hundred years may hold in store for it in this connection. Judging by past history, it will certainly have its problems but we do not doubt that it will also have its men to overcome them.

The company always has been progressive in character, and it has recently shown that it still possesses enterprise by planning a giant bridge to carry its tracks across the River Hudson into New York.

The book is beautifully bound and printed, and it contains numerous illustrations and maps showing the development of the Baltimore and Ohio system at different periods.

"The Book of Polar Exploration"

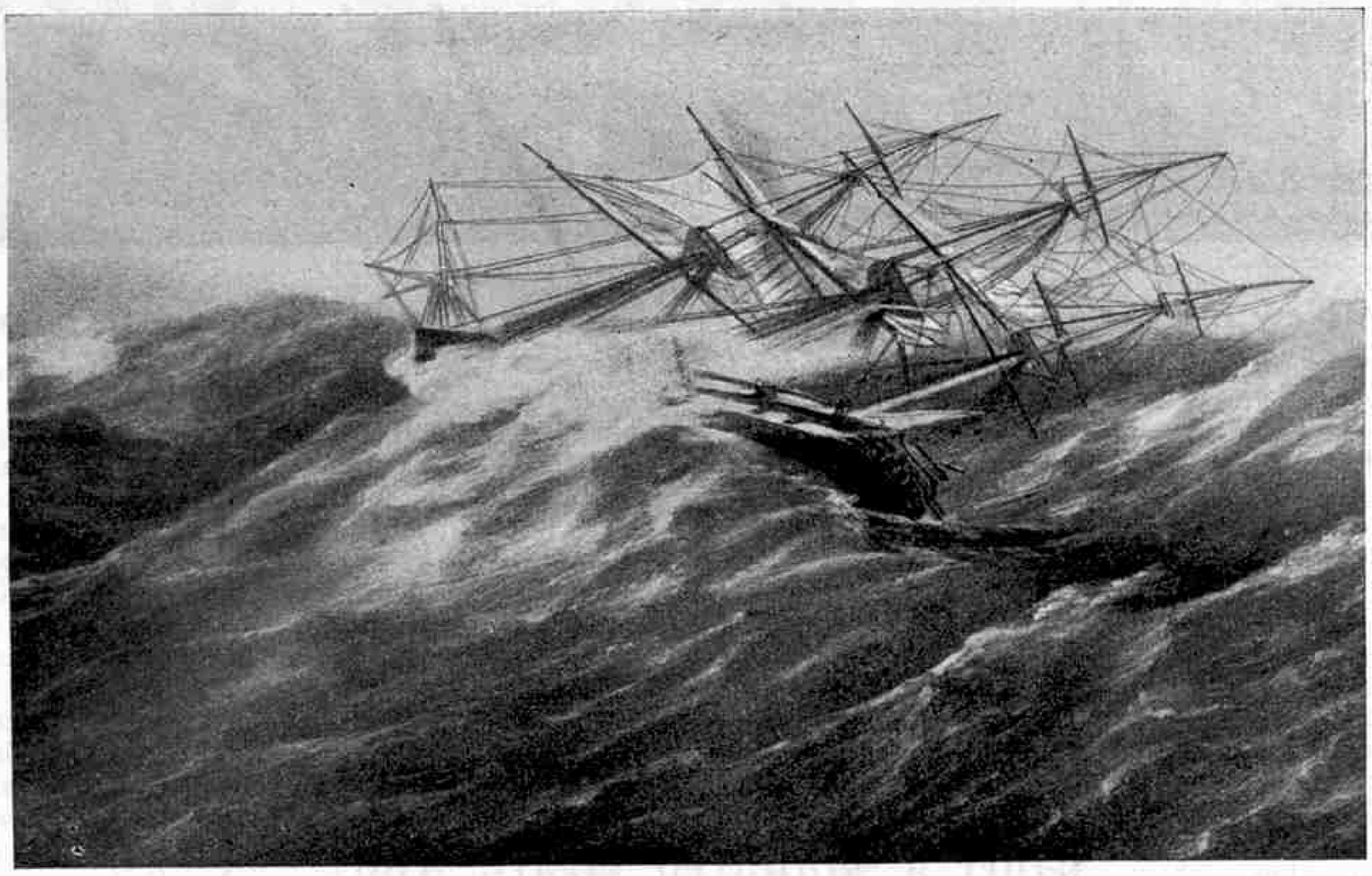
By E. L. ELIAS (Harrap. 6/-)

The Polar regions hold a great fascination for most of us—there is something particularly romantic about their position and distance, about their wastes of ice and snow and about the length of their unbroken day and night. That the subject does specially interest readers of the "*M.M.*" we know, because of the great number of expressions of appreciation we received when our series "*Exploring the Arctic*" was being published a short time ago. This book should therefore have a wide appeal, for it tells of the more important arctic and antarctic polar expeditions that one would expect to find in a book the size of which is necessarily limited.

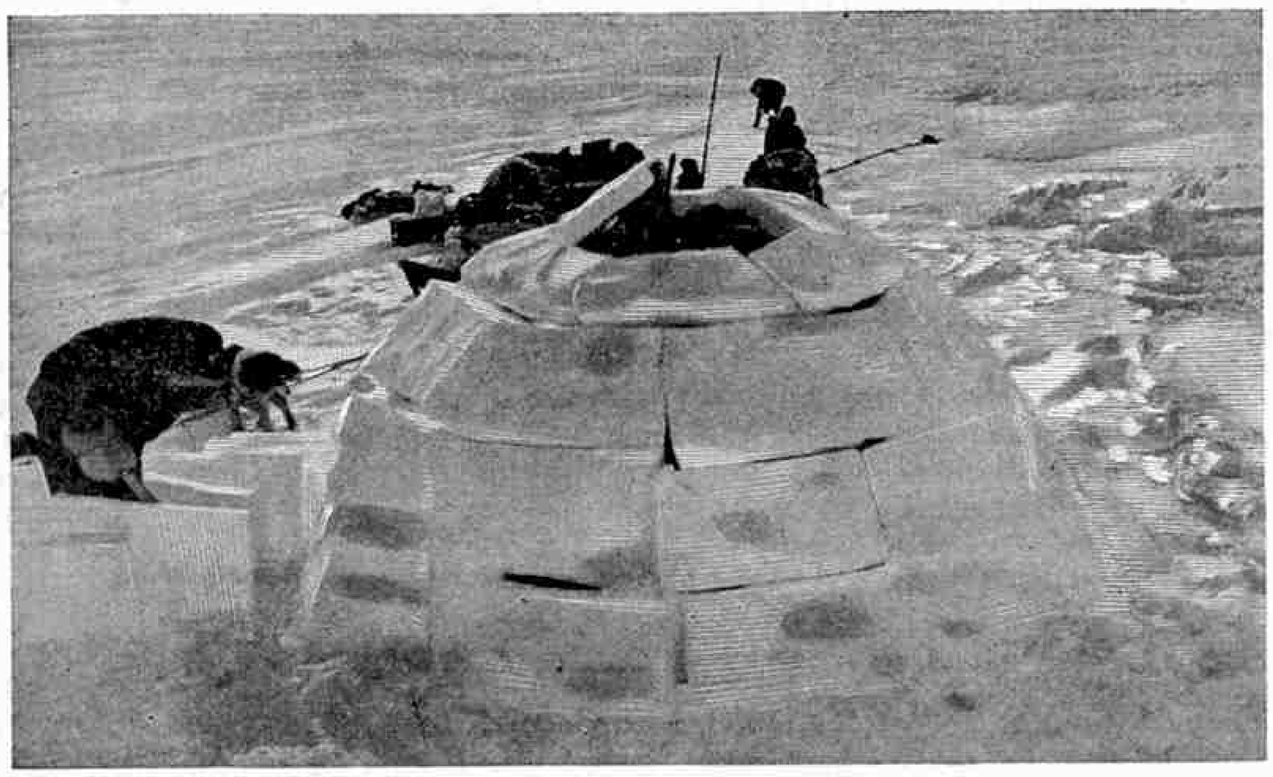
Among the earliest explorers were the men from Norway, but naturally not much can be said of their work because of the lack of details that have come down to us. We have more detailed information, however, of such later men as Martin Frobisher, John Davis, William Barents, and Henry Hudson. They were followed by Ross and Peary, then came Franklin's great attempt and M'Clure's discovery of the North West passage. Nansen's adventures in the "*Fram*" make fine reading, as also does the account of the occasion when that wonderful ship, under the command of Sverdrup, completed another adventurous voyage. By this time explorers were gradually getting nearer and nearer to the Pole, which was at last reached by Peary on 6th April, 1909.

The latter part of the book is devoted to exploration in the antarctic, where the names of Captain Cook and Sir James Ross conjure up romantic visions of adventure. Captain Scott's voyage in the "*Discovery*" and Shackleton's voyage in the "*Nimrod*" were followed by Shackleton's "furthest south," when the explorer reached latitude 88° 23′ south. "We have shot our bolt," he wrote, "and are homeward bound at last. Whatever regrets may be, we have done our best." The march home was a long and terrible struggle and incredible adventures often brought the explorers within a hair's breadth of death. Scott's second expedition in the "*Terra Nova*" in 1910 resulted in a journey that was destined to be one of the most remarkable in polar records. It was not until 1912 that Scott reached the Pole, however, only to find that the Norwegian, Amundsen, and four others had been there before him.

We read that the first attempt to reach the Pole by air—the hope of many an explorer—was made as early as 1897 when Andrée made a daring attempt to travel to the Pole in a balloon. The attempt ended in tragedy, however, for the explorers were never heard of again and no remnant of the balloon has ever been found. From 1923 onwards a series of attempts was made to reach the Pole by air, Spitsbergen being recognised as the best base from which to set out. The first successful voyage was made in the "*Norge*," which left its base on 11th May, 1926, flew to the Pole and circled it twice, flying thence to Alaska, where a landing was made, after covering 2,700 miles in 71 hours. The first aeroplane to reach the Pole was piloted by Commander Byrd, who flew to the Pole and back without landing, two days before the "*Norge*" accomplished her wonderful journey. Commander Byrd recently succeeded in an attempt to reach the South Pole by similar means.



The title of this engraving is "Hurricane," and it well represents one of the terrors of the high seas. (See previous page).



Placing the last block but one in position. From the "Book of Polar Exploration" reviewed on this page.

"Social Life of the Animal World"

By Fr. ALVERDES

(Kegan Paul. 10/6 net)

In this interesting book there is one point that stands out as being of particular importance, and that is the extraordinary difficulty in obtaining accurate and definite information about the habits of animals. This seems to have been one of the author's particular difficulties, as his book is based largely on the observations of others. He has, however, collected and summarised all the information at present available regarding the social life of animals.

The book deals not only with herd life and with the relations between mated animals and with the animals' family life, but also with the features that develop when a number of animals are grouped into an association. He attempts to prove that much that we commonly regard as strictly human is found equally in—and even may be regarded as characteristic of—animal groups and societies.

The book is certainly of interest to the student of social life, more especially as Fr. Alverdes contends that the solution of certain difficult problems in human life is to be sought and found in the animal kingdom.

"Stove Pipe Man and Sandy"

By A. CHALMERS

(Messrs. J. M. Dent & Sons. 5/-)

A story for younger children dealing with the delightfully fantastic adventures that follow the making of the "stove-pipe man" out of old stove-pipes by Sandy, the hero of the story. The couple run away from the scrap-iron man and down to the sea where they are picked up by pirates, whom they cleverly vanquish. Next, they are wrecked on a tropical island where they meet a poetical flamingo and some badly brought up cannibals! After many other adventures they sail for home and arrive in time for Christmas.

Interesting New Books

We hope to deal with the undermentioned books in an early issue.

"LIVING CREATURES"
by E. Von Wyss. (A. & E. Black Ltd. 12/6 net

"THE NAUTILUS LIBRARY"
Vol. to 12. (Philip Allan & Co. Ltd. 3/6)

"HOW TO MAKE OLD TIME SHIP MODELS"
by W. Hobbs.
(Brown, Son & Ferguson Ltd. 12/6)

Of General Interest

Possibilities of New English-grown Plant

A remarkable biennial plant called "Brotex" is now being grown in the South of England and promises to become exceedingly valuable. It resembles a species that is a native of the Canary Islands, and it is claimed that in 18 months it attains a height of 8 to 11 ft. It may be made to serve three purposes. The fibre of the stem of the plant is similar to flax and jute, and promises to be equally valuable for textiles; from the seed excellent cattle food may be made; and the core of the stem provides wood cellulose that is suitable for making into pulp for the paper-making industry.

It is hoped that by next Autumn enough seed will have been produced to sow 40,000 to 50,000 acres of land with the new plant, which is expected to be useful in agriculture as well as in industry. It may be introduced into an ordinary crop rotation, as its dense foliage makes it an ideal "smother" crop, and thus it is valuable for cleaning the land from weeds.

How to Gauge the Speed of the Wind

In fighting forest fires the number of men needed usually is proportional to the strength of the wind that is blowing. The rangers who patrol the great forests of Western America have become experienced in gauging this, and rules for measuring the speed of the wind based on their experience have been issued by the Forestry authorities of the United States.

According to these rules a wind is not regarded as a gale unless it breaks twigs off trees and is strong enough to inflict slight damage to buildings. A wind capable of doing these things has a velocity of 39 to 54 miles per hour. If the wind is so violent that it uproots trees, it may be regarded as a whole gale, a term used for a wind between 55 and 75 miles per hour. Anything stronger is called a hurricane, and no instructions are needed in order to help the rangers to recognise that!

The classification of winds short of gales is more important, as these are more common. A light wind that rustles leaves and is felt lightly on the face has a speed not exceeding seven miles per hour, while a gentle breeze of eight to 12 miles per hour keeps leaves and small twigs in constant movement, and causes a small flag to flutter. When the movement of the air reaches 13 to 18 miles per hour, it is capable of raising dust and causing small branches to sway; while if small trees in leaf waver, the speed of the wind may be considered to be between 19 and 24 miles per hour. It is then called a fresh wind, and is strong enough to cause wavelets to form on inlet waters.

A stronger wind that whistles through telegraph wires usually is powerful enough to give pedestrians the feeling that it is holding them back. The speed of such a wind is from 25 to 38 miles per hour, and a slight increase above the higher of these limits would transform it into an official gale.

Over a Hundred Years Ago!

"In 1274 the price of a small Bible neatly written was £30."—"HANTS ADVERTISER," 24th September, 1827.

"A ship from Holland, freighted with muskets, and commanded by an English captain, sailed lately from Amsterdam for Constantinople. The muskets are intended to arm the new Turkish militia."—"LIVERPOOL MERCURY," 6th April, 1827.

"On Saturday last the turning of the first arch of the new bridge on the Southwark side of the river, was completed."—"THE TIMES," 13th August, 1827.

"In Madrid, the shops of Chymists and druggists are kept closed, and the public are served from an aperture in the window. The origin of this custom is not known."—"THE TIMES," 7th February, 1828.

"We perceive that the carriage way in Fleet-street is about to be repaved. It has long been in a most dangerous state; and we hope the improved method of paving, with larger stones, and forming a surface nearly horizontal, will be adopted."—"THE TIMES," 21st June, 1827.

"The fracture in the Thames Tunnel is reported to have been occasioned by a hole made by a mooring stone formerly fixed there."—"HANTS ADVERTISER," 11th June, 1827.

Pilchard versus Salmon

One of the most interesting developments in the fisheries of Canada has been the sudden increase in the value of the pilchard, enormous schools of which enter the inlets on the Pacific Coast of Canada and remain there for months at a time. Until a few years ago these fish were largely disregarded on account of their oiliness, but suddenly it was discovered that the oil was exceedingly valuable for many purposes, and pilchards immediately became of great interest. Extraction plants were erected on the coast of Vancouver Island, and since 1925 the output of oil has increased from 500,000 gallons to almost 4,000,000 gallons. In addition, some of the better grades of the fish are canned for food, while other by-products are fertilisers and fish meal for chicken food.

In the past the most prominent fishing industry of British Columbia has been salmon canning, but it is prophesied that the pilchard will become a keen rival of the salmon for supremacy. The oil is highly prized by manufacturers of soap and toilet preparations, and is also used in the manufacture of paints and varnishes. The greatly increased demand for this product causes very little concern, for it is believed that the pilchard population of the northern Pacific Ocean is so great that it will be able to stand the drain upon it for many years to come.

How to Make Hot Ice!

We are all familiar with the effect of varying temperatures and know, for instance, that every gas in existence becomes liquid if the temperature is lowered sufficiently. Equally remarkable changes may be brought about with the aid of pressure, and in recent years this field has been explored with great success. For example, it has been discovered that ammonia can be manufactured from the nitrogen in the air quite easily if the work is carried on under a pressure of 15,000 lb. per sq. in. instead of 14 lb. per sq. in., which is the normal pressure of the atmosphere.

An American professor has constructed a machine to produce a pressure of no less than 600,000 lb. per sq. in. This crushing force is as great as that which would be experienced at the bottom of an ocean 250 miles in depth! When subjected to this pressure, steel began to run like putty, and rubber became so hard that it could be used as a die to cut steel. A very interesting experiment was made with quicksilver. Normally the freezing point of this metal is 72°F. below zero, but under a pressure of 200,000 lbs. per sq. in. the liquid "freezes" at ordinary temperatures into a mass as solid as a piece of steel.

A similar effect was the production of "hot ice!" The effect on water of a pressure of 600,000 lb. per sq. in. is to turn it into a solid form that can only be described as ice. Under such enormous pressure "freezing" takes place even at a temperature of 149°F., and the ice thus made would be uncomfortably hot to the touch!

How Much Water is there on the Earth?

A fairly accurate estimate of the quantity of water contained in the seas may be obtained by measuring the area they cover and their depth. The five great oceans have a surface area of 142 million square miles, and average 2½ miles in depth. The volume of the water in them is thus approximately 331 million cubic miles. To this must be added the volume of the water in lakes and rivers, which raises the total to 332 million cubic miles.

There is also a large quantity of water in the ground and in the atmosphere. This is very much less than that in the oceans, of course, as it is merely absorbed or percolating water; and in accounting for it a figure of three million cubic miles will probably suffice. This gives a final total of 335 million cubic miles.

When we remember that this enormous quantity of water is restricted to the surface layer of the Earth, we need not be surprised to find that occasionally it rains! If all the water on our globe were gathered up into the clouds and allowed to fall as rain over the whole of its surface, the "shower" would be quite a long one. Even if our imaginary rain were as heavy as the greatest downpour ever experienced, it would continue for more than eleven years!

An interesting way of realising how much water there is on the Earth is to imagine it pumped into a huge cubical tank. It would be found that a vessel 694 miles in length, breadth and height would be required to hold it. If such a tank were placed with one corner in London, a second corner could be placed at Barcelona in Spain. Of the remaining two, one would then be on the eastern border of Germany, and the other about halfway down the Adriatic shore of Italy. The top of the tank would be completely beyond our reach, for its height would be 126 times that of Mount Everest!

A very large outflow pipe would be required to return the water from such a tank to the bed of the ocean. One with the capacity of Niagara Falls at its best would be hopeless for this purpose. It would carry away a mere 200,000 cu. ft. of water every second, and at that rate the last of the water would not find its way back again until more than 17 million years afterwards!

One of the largest systems of water drainage in the world is that formed by the rivers Mississippi and Missouri, and their tributaries. Its capacity enables it to carry away the surplus water of half the area of the United States, but it would take it nearly 7,000 centuries to empty a tank containing all the water on Earth! It is supposed that the earth will become dry and consequently unable to support life. Fortunately the evaporation of this enormous quantity of water will require a considerable time!

Courtesy] [*Metropolitan Vickers Electrical Co. Ltd.*

Transporting one of six Surface Condensers for 25,000 kw. Turbo-Alternator Sets for Bunnerong Power Station, Sydney, N.S.W.

More Queer Foods

The latest addition to the list of queer foods is volcanic earth, a soil that has the taste of unsweetened gelatine. It is found on the slopes of Mt. Asama, a Japanese volcano, and must surely be one of the most remarkable foods in existence.

A complete list of the strange things that men eat would be of great length. It would include salads made from chrysanthemums; cakes baked from flour made from the bulbs of water-lilies; boiled seaweed, of which there are more than 200 edible varieties; and a kind of marmalade made by cooking wild bees in a special syrup. Even the Japanese earth eaters are not unique, for the natives of Java mix clay into a paste with water and bake it like gingerbread biscuit. It is said that sand is eaten by Spanish ladies, but in this case there is no intention of extracting nutriment; the sand is supposed to be good for the complexion!

The inhabitants of many countries eat foods, such as insects and snakes, that to us would be quite repulsive. The Javanese pick out the fat grubs found wriggling under the bark of trees, and either stew them or roast them on spits. Caterpillars are a favourite delicacy among the Piute Indians who live on the western slopes of the Rocky Mountains, and snakes are eaten by natives of South America and Australia.

The disgust felt by white men at the thought of eating many of these foods is, in many cases, probably a matter of custom. There is a great deal in getting used to an idea and, after all, even such a common food as the potato did not become universal without opposition. Nevertheless, one can scarcely imagine an Englishman enjoying a meal of slugs! Yet the Chinese are very fond of these, and prefer fat juicy sea slugs as large as a man's hand. The broth made from these weird creatures is stated to be very sustaining.

Ants and their eggs are favourite foods of many races. The Siamese make with the eggs a paste that has the flavour of sweet almonds and is considered a great delicacy. The idea of eating minced monkey may sound a little unpleasant, but probably the dish would be enjoyed if it were given some other name. Woodchucks and muskrats taste very much like rabbit, and even the alligator may provide good food. It is stated that some cuts from this fearsome reptile are almost as tasty as veal cutlets!

The honour of being the world's most remarkable food perhaps belongs to the bitter cassava root of South America, for this contains prussic acid, which is a deadly poison! The poison, however, is completely removed by washing the root in running water. One wonders how many accidents occurred before the discovery of this method of making the root harmless!

Discovery of the Wheel in America

A few years ago an antiquary discovered a huge stone disc among the ruins of an ancient city in Panama. It was more than 6 ft. in diameter, and about 18 in. in thickness, and through its centre was a large hole. It seemed to the discoverer that the disc could only have been used as a wheel, and he thought that possibly it had been used for transporting heavy stone blocks for the use of builders. He was greatly puzzled by it, however, for until then it had been believed that the use of wheels was entirely unknown to the natives of America until the arrival of the Spaniards in the 15th century. He said very little about his discovery, therefore, thinking that possibly it was a millstone brought across the Atlantic Ocean by a Spanish colonist.

Recently the same explorer began to dig out the remains of the wonderful cities that once flourished in Peru, and to his surprise he came across two similar discs. These certainly had been buried in the earth before the coming of the Spaniards, and their discoverer was unable to resist the conclusion that they had been used as wheels. Thus the idea that the wheel was unknown in America until its introduction by Europeans has been proved wrong. The Indians living on the continent at the time of its discovery may not have known the use of the wheel, but the highly civilised races who preceded them apparently were quite familiar with it.

The discovery also helped to solve an interesting problem. The ruins that have been uncovered consist of the remains of walls made of enormous blocks of stone. These are so huge that it is difficult to imagine how they could have been transported from the quarries to the sites on which they have been found. It is now suggested that they were slung on stout poles that were carried on the axles of pairs of huge stone wheels of the kind that have now been discovered. There would be less difficulty in transporting in this manner blocks of stone weighing many tons than there would be in raising them to their positions in large buildings!

The Twin Sisters of Fairy Lake

An Indian Story

By H. M. Driftwood

SYNOPSIS : Dawn, a young Indian girl of the Algonquin tribe, has annoyed a loon (a bird) swimming in Fairy Lake by imitating his call. According to tradition the spirit of a former chief of the tribe dwells in this loon, and whoever angers the bird suffers misfortune.

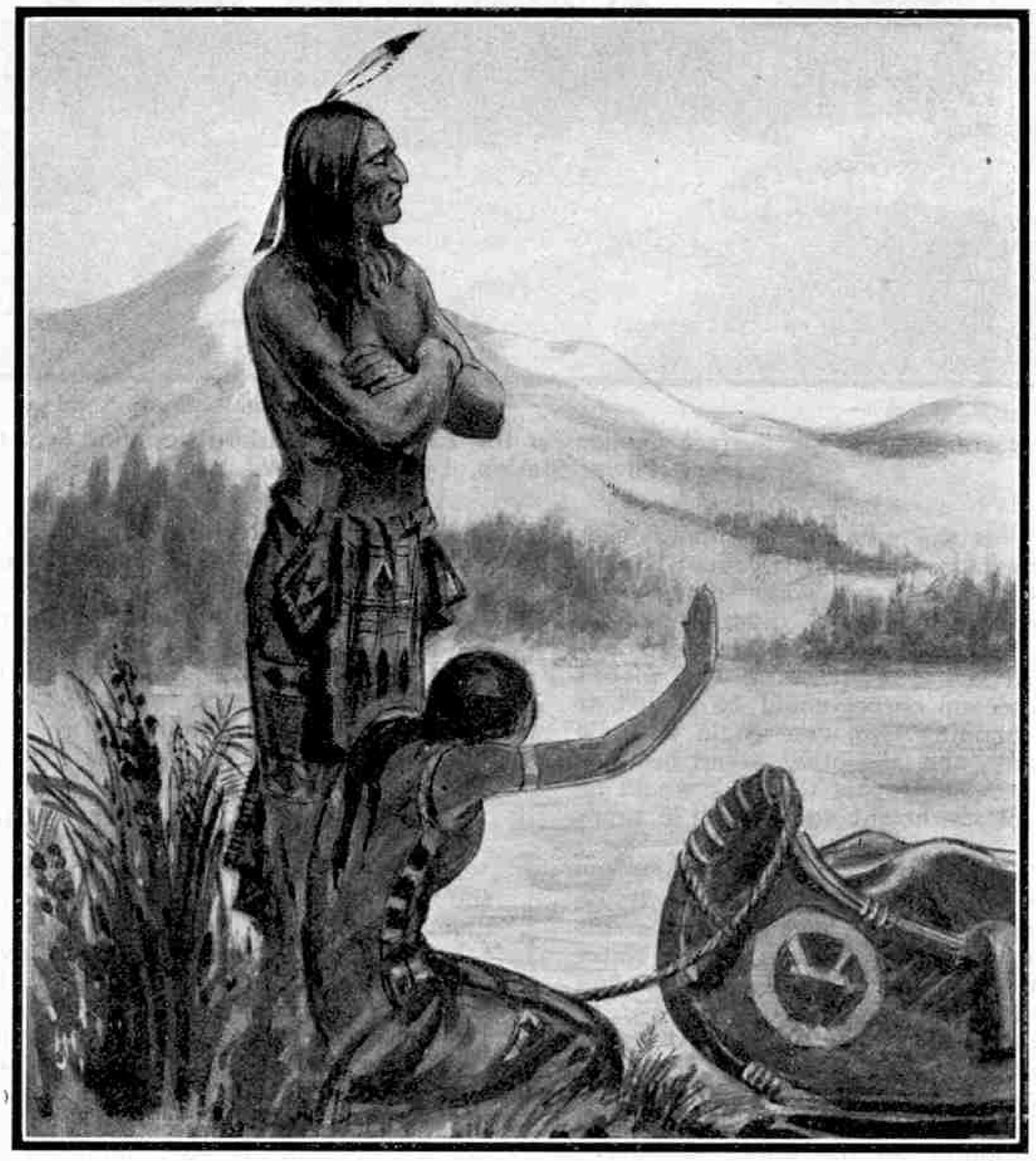
A great storm arises while Dawn is paddling across the lake. The Beaver, an Indian brave, realises her danger and sets out in his canoe to her assistance. The storm increases in violence and a sudden gust overturns Dawn's canoe. Now read on.

II.

AS Dawn battled despairingly with the current the minutes seemed like hours, and slowly she became weaker.

What was that she saw as the lightning lit up the lake ? Darkness fell. It was passing her a hundred yards or more away, she was sure of it. Another flash. Her heart beat fast—it was a canoe. She screamed at the top of her voice while the wind howled. Lightning appeared to light up the scene deliberately so that she could see her one hope passing. She might have floated to the south shore of the lake but she felt there was an unseen enemy behind her, ready to pounce upon its victim, so she struggled on.

The Beaver went by with the wind and the current. Thunder, the shrieking of the wind, and the lapping of water drowned Dawn's voice ; it was blown away from him. Then something came to him on the wind when he was quite beyond Dawn, something that chilled him. Wasn't that Dawn calling for help ? Agonizing moments ensued while he drifted on. Yes, there it was again. There was no mistake about it this time. It was coming down the wind to him.



"We have given our daughters arms, food, gifts, and a canoe, so that they may journey across the watery spaces to the Great Manitou and pacify Him for us."

With a herculean effort he tried to swing the canoe around. Part way it swung, but the waves dashed against it and the wind forced it back. Time after time the resistance proved too great. It could not be done—he was travelling away from the sound. Dawn's cry came to him full of terror. Waiting for the next flash of lightning in the hope that she might see him, he rose to his feet without hesitation, flung his arms above his head and plunged into the lake.

Through the darkness and into the wind he fought against the current, tireless as the beaver he had been named after. It was strenuous work. Once more the girl's voice reached him, more feebly than before but evidently much closer. Urged on by the knowledge that she was alive, he fairly slashed the water into foam. With the intuition of the Indian, he swam straight in the direction of the hail.

Dawn saw him dive from the canoe and knew his purpose. Weakness made her sleepy ; it gripped her ; made the water feel like the comfort of a bed. She wanted to slip away into the depths and rest. but the sense of it warned her and she struck out for the Beaver. A few yards on she came in contact with something solid. Grasping it eagerly with both hands, she brought her weight to bear upon the driftwood. It sank and she went under. Coming to the top, she struggled mechanically for a few minutes when her hand touched the wood again. She clutched it wildly, yet found it no more buoyant. The lake closed over her. A great weight held her down ; she was suffocating. When she finally came to the surface her only thought was to call for help, and she screamed until she became unconscious.

The lightning played across the sky in a continual chain, and by its aid the Beaver saw Dawn grappling with life and death. Would the Great Spirit fool him even as the loon had been fooled ? There, she sank before his eyes ! He was too late ! No ! She came to the surface. With the ferocity of a bear, he wrestled with time and nature.

As Dawn's body relaxed for the last time, to sink into the depths, the brave reached her. But what could he do ? Now that he had the girl in his arms he began to realize he had none too much strength left. He felt he could not swim against the storm long enough to reach the shore. To add to his distress, the rain descended with the sting of sleet. There was nothing else for it—he must drift with the storm to the south shore of the lake.

An hour later the rain stopped and the clouds parted to let the moon look down upon the prostrate form of a girl over which laboured the glistening body of the Beaver. "Spirits of our fore-fathers," he murmured, "Help me to bring back my Dawn. Breathe into her mouth and give her life. Speak to her ; wake her."

A sigh broke from her lips. Feverishly he rubbed her limbs and body, slapping, rubbing and pinching them. After a time she moved and her eyes opened.

* * * * *

Six years passed during which time Dawn had become the Beaver's wife. No ill-fortune had dodged their path as the Medicine Man had predicted. Two little girls of five summers, whom everyone called the Twin Sisters, graced their home and they were happy.

One day in August, Dawn said to the Beaver : "Let us go back to Fairy Lake and give presents to the Spirit for having delivered me from the power of the loon. We will pitch our tepee on the island near the pine."

Thus the Beaver and his family returned to the island to find that the big pine had been uprooted by a recent storm. They found that it had fallen across the gap between the two islands and lay with its trunk on the one while the top rested on the other. In this way it formed a bridge across the channel.

It was a disappointed Dawn that stepped ashore. "I can't stay here," she said. "It doesn't seem like the same place. The spirit that lived in the tree has fled."

"We will camp for a few days," replied the Beaver. "Together we spent many happy days here years ago; we will not remain long. To make an easy crossing from one island to the other, I'll trim off the branches on the upper side of the pine."

That night the Northern Lights flamed and flickered in the heavens, having the appearance of coming to a common point directly over the island. The Beaver saw them and shuddered. The following night they flared again converging overhead. Turning to Dawn he said: "See, the Dead Men dance in the north. There is an old saying that if this happens three nights in succession there will be death stalking near those over whom they dance. To-morrow choose you the best we have and throw it into the lake as an offering to the Great Manitou."

The third night the lights were brighter than ever, concentrating at the zenith, yet diverging from this same point to reach down into the vast spaces of the southern, eastern, and western skies.

"They hem us in all around," the Beaver thought. All night he kept guard lest some evil should walk into the camp and take its toll. As the first rays of the morning sun pinked the clouds in the east, he leaped into his canoe and hastened to a distant camp to seek the aid of the Medicine Man and have him turn aside the impending calamity. No more was the Owl, Dawn's father, living on the shore of the lake, so he could not have his counsel.

It was sundown when he returned, and while yet some distance from the island he heard the sobbing voice of Dawn calling: "Come out of your hiding, Twin Sisters. Where are you? Call to me you are all right."

Had something happened to the sisters? He leaped ashore and rushed to his wife.

"What has happened? Where are our daughters? Have you let someone hurt them?"

"I do not know," answered Dawn, hysterically. "They were here a few minutes ago playing about me while I dozed. When I awoke I could not find them anywhere. At first I imagined they were playing a prank on me and left them alone. Now, I can't explain it."

"Have you seen anyone to-day? Some person may have sneaked up on them and carried them away."

"No one has been around. Still, the twins may have made a raft and drifted off, though they hadn't time to go far."

Jumping into his canoe, the Beaver paddled rapidly and stealthily towards the main shore and thence around the margin of the lake. His eyes probed the twilight shadows for the slightest movement and he scanned the surface of the water for the wake of a canoe, the clue that would indicate the passage of the kidnappers—a clue that no craft can conceal from the Indian trailer if made within the hour.

As the twilight gave way to darkness, a derisive, mocking laugh pealed out from somewhere on the lake. The Beaver caught his breath. Could it be the same one? The loon called once more and in it was the wail he remembered so well. Was the Evil Spirit on their trail?

Dawn! If anything happened to her! With the thought he swung the canoe around and hurried back to the islands fearful lest his Dawn be stricken.

"You have them?" a voice greeted him.

"No," he quietly replied, and as he raised his head to the Great Fathers he beheld the Northern Lights. In the midst of the rest two small streamers were leaping and flaring.

"See," he said to Dawn, "the Twin Sisters are dancing among the Dead Men."

When morning came the Beaver began an investigation. As he passed across the tree bridging the channel between the islands he beheld the feather of a crow among the branches of the pine that were in the water—those on the underside had not been cut off. He recognised it as the feather one of the twins wore in her hair. Were they down there? They couldn't be drowned! Had he not taught them to swim?

In a frenzy he severed the branches from the tree. Stout and long they proved to be, with considerable foliage. As he pulled away an extra large limb the body of one of the Twins came to the surface; when more were removed the other did likewise. Upon the temple of one of them he noticed a cut, while the other's toe was bruised.

He saw it all in the flash of a second. Obviously they had been attempting to cross the log when the one in the rear had stubbed her toe. Losing her balance, she collided with the leader and together they had fallen into the water. Evidently the leader had struck a big limb with her head as she fell, which rendered her unconscious. The weight of their bodies had carried them through the tangled masses of branches, and the branches had held them down.

With a heavy heart, and the Indian dread of touching a dead body that had been claimed by the Spirits, he drew the bodies to the south shore by means of a pole secured to the end of his canoe. Here he worked for some time on a small birch-bark canoe. When it was finished the bodies of the Twin Sisters were placed in it and surrounded by choice pieces of food, bows and arrows, and their playthings and the best around camp.

Then calling Dawn he said: "Let us bury the sisters upon the heights so that they may watch for the commands of the Spirits of the Dead Men to go and serve them. We have given them arms, food, gifts, and a canoe so that they may journey across the watery spaces to the Great Manitou and pacify Him for us."

Hoisting the bier upon their shoulders Dawn and the Beaver bore it to the highest point of land that overlooked the islands and faced the north, and there buried it in a shallow trench.

* * * *

In this way, it is said, the Twin Sister Islands of Fairy Lake, near Huntsville, Ontario, received their name. Hundreds of thousands of people going to the Lake of Bays have passed these isles without knowledge of this little tragedy, while for a century the Sisters have watched from their outlook, perhaps marvelling at the changes all around them. Strangely enough, a tourist trail now leads to the pinnacle and it is called the Twin Sister Trail of Fairyport.

Courtesy] [*Baltimore and Ohio Railroad*

Princess "*Dawn Mist*" at the Indian encampment at the centenary celebration of the Baltimore and Ohio Railroad.

How to Get More Fun—(*Continued from page 57*)

when the time comes make their arrangements accordingly.

Promptly at 8.15 the express goods special leaves A, with the big 4–4–2 Special Tank in charge. Soon the station at B comes into view and the signals show that the train is to be diverted into the loop. At the main line platform the local train is standing. Thus the way is clear for the special and after negotiating the points beyond the station the driver opens out and makes good time until approaching C, when a slack is necessary.

The "down" express should arrive here shortly after 8.16, thus giving the special ample time to reach the passing loop. If one of the two trains is behind time, the other must be held up in the station until the way is clear, but if both are punctual they will pass in the station itself. It is scarcely likely that the "down" express will be late, for it has travelled only from D, and is a Pullman train with a No. 2 Special Tender locomotive at its head.

The timing worked out for these trains is a little on the tight side, and the operators in charge of the layout must move their points and signals very quickly. But it is surprising how rapidly the necessary operations may be carried out, and the fun and excitement of working in special trains in this manner is well worth the planning and preparation required.

Answers to Christmas Puzzles

The puzzles published on pages 928 and 929 of the "*M.M.*" for December, 1929, aroused great interest. Although no prizes were offered a very large number of solutions have been forwarded to us by keen readers, who clearly enjoyed working out the answers to the varied collection of 34 puzzles given. For the benefit of other readers we give below the solutions and comments on several of the more intricate of the puzzles.

Fig. 16

No. 1. Keen eyes will readily discover the following objects on the side of a penny that bears the King's head: Hare (hair); temple; neck; brow; I (eye); lid (of eye); lash; lock; bridge (of nose); crown; ear.

No. 2. The letters in this puzzle represent the numbers from 0 to 9, in accordance with the following code: A=3; B=5; C=8; D=7; E=1; F=9; G=0; H=2; J=4; K=6.

No. 3. Here the key to the solution is the position of the word "John," and the correct address is: John Underhill, Andover, Hants.

No. 4. The solution is as follows:—Stevenson; Smeaton; Trevethick; Macadam; Arkwright; Hele Shaw; Cartwright; Maudsley; Murdoch; Crompton.

No. 5. The first four broken letters are clearly STRA, and there is little doubt that the last two form the word "IS." This observation quickly leads to the identification of the proverb as "Truth is stranger than fiction."

No. 6. The woman had 301 eggs to sell.

No. 7. Jones came home at 6 o'clock.

No. 8. The solution of this interesting problem is given in Fig. 8, and it will be seen that the numbers are arranged in an orderly manner, the smallest numbers falling in the same column as the largest, and so on.

10	11	14	15
9	12	13	16
8	5	4	1
7	6	3	2

Fig. 8

No. 9. The condition that the fourth is the square root of the second limits the last digit to 2 or 3. It cannot be 3, however, for the cube of 3 is 27. Therefore it must be 2. The rest is easy and the number is quickly found to be 1492.

No. 10. The number of passengers when the train started was 141.

No. 11. The clues given in rhyme easily lead to "Teeth," as the solution of this puzzle.

No. 12. The hidden name represented is: "Imagination."

No. 13. When the missing words are filled in the rhyme is as follows:—

"Mary sat with *slate* in hand
Writing *tales* dramatic.
Did she *steal* the plots she planned?
Negative emphatic!
Stale to us the *tales* may be,
But at *least* they're new to she."

No. 14. The required change may be made by moving five of the sacks in order to bring them into the positions shown in Fig. 14.

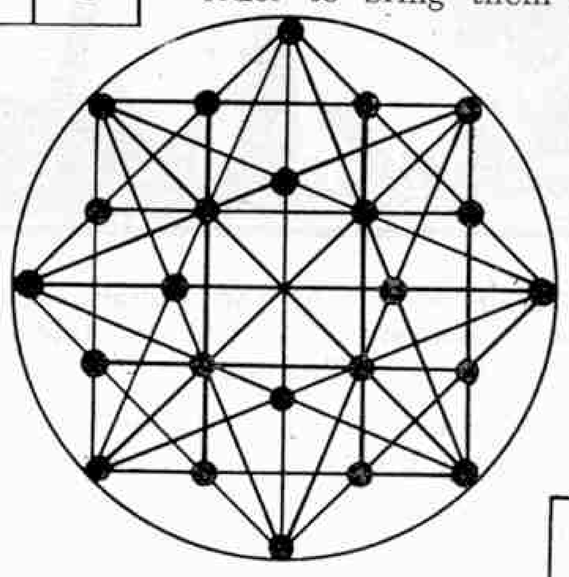


Fig. 28

No. 15. The proverb hidden in the long sentence given in this puzzle is: "Time and tide wait for no man."

No. 16. The solution of this novel crossword puzzle is given in Fig. 16.

No. 17. The reduction in price on taking three handkerchiefs is equal to the profit gained by selling two separately. This fixes the profit on each at ¾d. and the cost to the draper at 3¾d.

No. 18. Each word in the solution of this puzzle must contain four letters, and the square obtained is as follows:—

ACHE
CAIN
HIND
ENDS

No. 19. The beginning of the list of names of well-known cars concealed in the word-square is in the eighth square down of the eighth column. The full solution is: Hispano Suiza; Amilcar; Stutz; Sunbeam; Chrysler; Arrol Aster; Bentley; Ford.

No. 20. The four parts into which the number 45 must be divided in order to satisfy the complicated conditions are: 8; 12; 5; 20.

Fig. 14

No. 21. The problem of dividing the contents of the first vessel into two equal portions of 4 pints each may be solved as follows: First fill B. Then fill C with the oil from B, and pour the contents of C into A. Now we have 6 pints in A and 2 pints in B. Pour all the oil in B into C and fill B from A again. This gives 1 pint in A, 5 pints in B and 2 pints in C. Fill up C from B and pour its contents into A, making 4 pints each in A and B.

No. 22. The wires and pipes follow the courses laid down in Fig. 22, from which it will be seen that the third water pipe from F to B is taken underneath the third house C.

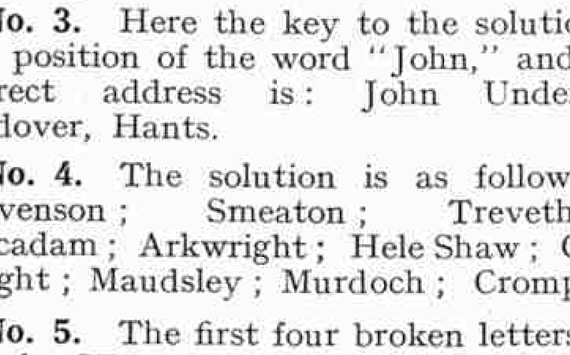


Fig. 22

No. 23. Quite a long time may be spent in searching through the dictionary in order to find a suitable long word containing the 26 letters. This is quite unnecessary, for "Alphabet" is the correct solution.

No. 24. The sentence, or the nearest approach to it that may be written, is: "There are three *two's* in the English language." But there is only one word spelled two, and the same is true of the words *too* and *to*. To express the meaning of this sentence correctly in writing is impossible.

No. 25. The solution to this problem is given in Fig. 25.

8	256	2
4	16	64
128	1	32

Fig. 25

No. 26. The solution worked out by the draughtsman was: "Take a round rod, the cross section of which is half-an-inch in diameter, and cut off a piece half-an-inch in length. If this is laid on its side it will be seen that it will just fit the ½ in. square hole."

No. 27. The answer is "King's Cross."

No. 28. The gardener who originally solved this problem arranged the 24 trees in three concentric rings of 8 trees each. The result is shown in Fig. 28, on which lines indicate how the trees form 24 rows.

(*Cont. on page 74*)

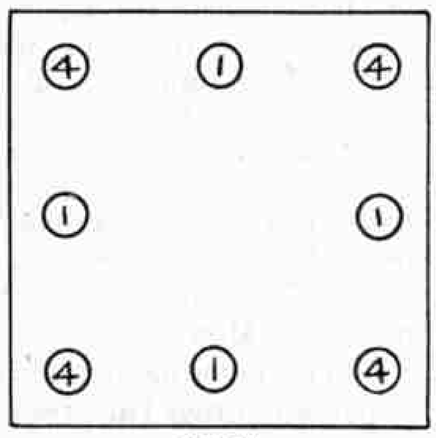


Fig. 33

A Giant American Freight Locomotive

Handles 4,000-Ton Trains on the Northern Pacific Railway

By H. H. Humphries

THE American Locomotive Company recently completed at their works at Schenectady, N.Y., for service on the Northern Pacific Railway, a locomotive that is claimed to be the largest and heaviest yet built. This monster is of the single expansion "Mallett" articulated type, with a 2-8-8-4 wheel arrangement. It is known on the Northern Pacific Railway as the "Yellowstone" type.

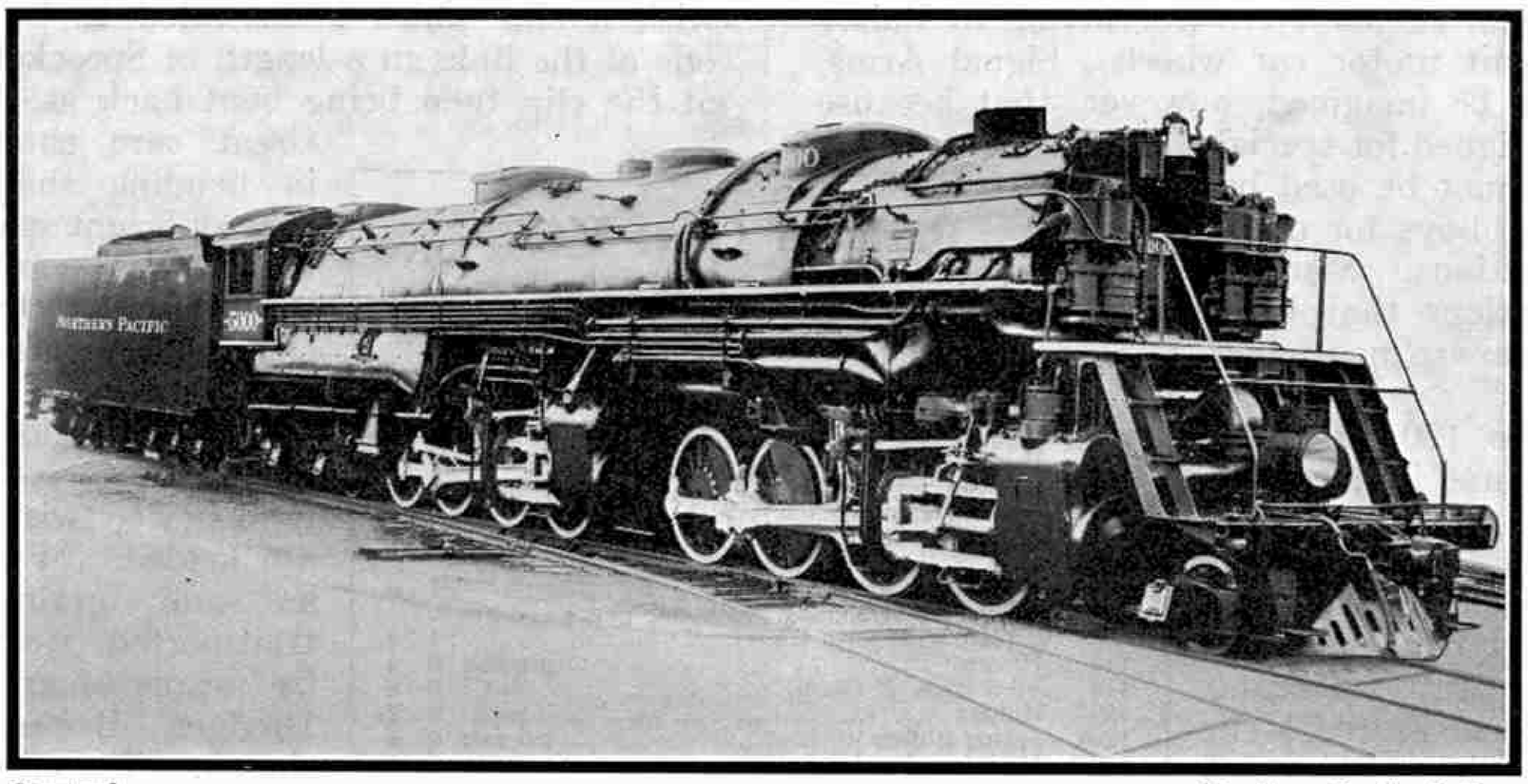
This locomotive rides the rails on 34 wheels, including 12 on the tender. The total weight of engine and tender is 1,118,000 lbs., of which 717,000 lb. is the weight of the engine and 401,000 lb. that of the tender. Of the engine weight, 553,000 lb. is on the drivers; 48,500 lb. on the front truck, and 115,500 lb. on the trailing truck.

All four cylinders have the same diameter and stroke, 26 in. by 32 in.; and the boiler—claimed to be the largest locomotive steam boiler ever built—operates at a pressure of 250 lb. The driving wheels have a diameter of 63 in. The engine develops a tractive power at 75 per cent. cut-off of 140,000 lb., and with the addition of the power of the trailer type booster with which it is equipped, 13,400 lb., has a total tractive power of 153,400 lb. Altogether this giant locomotive is capable of developing considerably over 6,000 h.p.

The overall length, between couplers, of the engine and tender is 125 ft., or three times the length of a standard American freight car. The height from the top of the rail is 16 ft. 4 in.

As it was desired to use semi-bituminous coal, obtained from an open pit owned by the company in south-eastern Montana, special boiler requirements were necessary. This particular coal, while of comparatively low heating value, burns fiercely; and in order to obtain the required boiler horse power from the heat developed it was necessary to design the largest firebox and boiler ever applied to a steam locomotive. This boiler is conical in shape and is built for a working pressure of 250 lb. per sq. in. The grate area is 182 sq. ft.; the total evaporative heating surface 7,673 sq. ft., and the total superheating surface 3,219 sq. ft. The weight of the boiler alone is 165,000 lb., and more than 20,000 holes were drilled in it during construction. The firebox, including the combustion chamber, is 28 ft. 6 in. in length by 9 ft. 6 in. in width, making a total of 182 sq. ft. of grate area. The mechanical stoker is of special design and is capable of crushing, delivering and distributing to the firebox hourly a maximum of 22½ tons of coal.

The unusual length of the grates, 22 ft. 3 in., made it necessary to provide some additional means of manipulating a rake in the firebox, otherwise than through the fire-door. Two openings, 9 in. by 14 in., arranged on opposite sides of the firebox, were accordingly provided. They are situated about 16 ft. from the rear of the firebox, so that it is possible, with the ordinary style of fire-hook, to rake any part of the grate area from the fire-door or either of the two side openings.



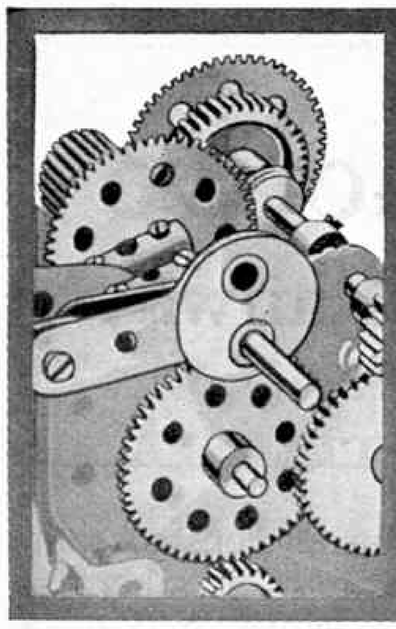
Courtesy] [*Northern Pacific Railway*

The new 2-8-8-4 articulated locomotive in service on the Northern Pacific Railway. It is claimed to be the largest and heaviest locomotive in the world.

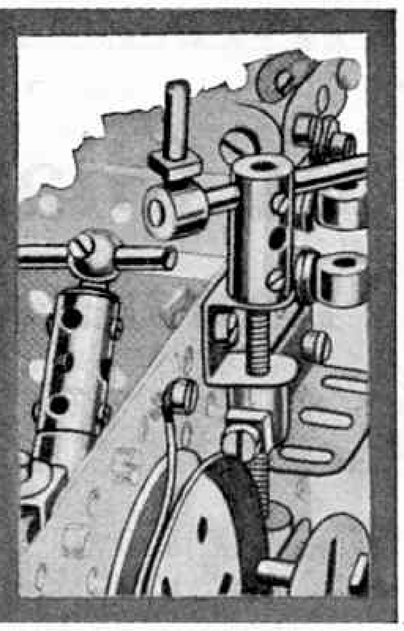
The tender has a capacity of 22,000 gallons of water and 27 tons of coal. The Coffin feedwater heater installed consists of two heaters welded together, so as to provide the same uniformity of steam passage as the single unit but with double its heat transfer capacity. Steam is admitted to the four cylinders by means of an American multiple throttle, which is power operated; and this is claimed to be the first installation of a power throttle device on a steam locomotive.

This new locomotive is in regular freight service over the 216 miles of Northern Pacific line from Mandan, North Dakota, to Glendive, Montana. This district has maximum grades of 1.1 per cent., the position and extent of the grades being such that double-heading is not practicable. Before this new engine was placed in service it was necessary for freight trains arriving at Glendive from the west with 4,000 tons to be split into practically two trains for movement from Glendive to Mandan. Precisely similar conditions prevailed at Mandan, and surveys have shown that to remodel the line so as to provide grades of four or five-tenths per cent. ruling grade would be a very costly undertaking.

The locomotive described here was designed to draw a 4,000-ton train in both directions over this district, and it has proved successful in reducing by at least 50 per cent. the train miles necessary to move freight traffic.



HOW TO USE Meccano Parts



XI.—Special Accessories (Class P)—cont.

For the purpose of this series of articles we have grouped all the Meccano parts into two main sections, termed the Structural and Mechanical Sections, and these sections have been further divided into a number of separate classes. The complete grouping is as follows. Structural Section: Class A, Strips; Class B, Girders; Class C, Brackets, Trunnions, etc.; Class D, Plates, Boilers, etc.; Class E, Nuts and Bolts, Tools and Literature. Mechanical Section: Class M, Rods, Cranks and Couplings; Class N, Wheels, Pulleys, Bearings, etc.; Class O, Gears and Toothed Parts; Class P, Special Accessories; Class Q, Miscellaneous Mechanical Parts; Class T, Electrical Parts; Class X, Motors, Accumulators, etc.

THIS month we conclude the description of Meccano parts grouped under Class P (Special Accessories), the first part of which appeared in the November *"M.M."* By "Special Accessories" we mean those parts that are designed for special purposes, such as Shuttles (for looms), rubber tyres (for fitting to Pulley Wheels to represent motor car wheels), Signal Arms, etc. It must not be imagined, however, that because these parts are designed for special purposes, they cannot be used by ingenious Meccano boys for other very different functions. Some of the novel adaptations that have been found for them are mentioned in this article.

The Buffers (Nos. 120 and 120a) are designed for use in Meccano models of railway vehicles. Both types are mounted on threaded shanks and fitted with standard nuts so that they can easily be incorporated in any Meccano model. No. 120 measures $\frac{1}{2}$" in length, excluding the shank, and is cut from the solid, while No. 120a, which measures $\frac{5}{8}$" in length without the shank, is provided with a separate sleeve that encloses a compression spring placed upon the "ram" of the Buffer. Hence the part actually functions as a shock absorber.

The Spring Buffer may also be employed for other very different purposes. In Fig. 9, for example, it serves as a spring catch to hold a hand lever in position after the latter has been moved from one side to the other. The lever passes through the centre hole of a Coupling 19 and carries a second Coupling 20, which presses upon the Spring Buffer 21 and is provided with two 7/32" bolts inserted on opposite sides. These bolts act as stops to prevent the lever moving too far in either direction.

One of the most interesting adaptations of the Spring Buffer is included in Standard Mechanism No. 115 (Meccano Electric Controller). This mechanism is reproduced at Fig. 11, and it will be seen that the Spring Buffer 5 acts as a spring-controlled contact-piece, which ensures good contact being made with the studs of the resistance. The sleeve portion of another Spring Buffer is bolted at 9 to act as a stop to prevent the contact-piece being moved too far in either direction.

The Dredger Bucket is intended for use in models of excavating machinery and conveyors. It is provided with a clip which is intended to be pushed through one of the links in a length of Sprocket Chain, the ends of the clip then being bent back as shown in Fig. 13. Great care should be exercised in bending the clips to ensure that sufficient space is left between their ends to admit the teeth of the Sprocket round which the chain must pass. The Chain 2 on which the Buckets 1 are mounted should be kept as taut as possible, else there will be a tendency to twist when the buckets are loaded. Fine material, such as sand, grain, etc., may be transported quickly and easily by means of an endless chain of Dredger Buckets arranged as shown. The clips incorporated in the Buckets are frequently removed and used for connecting other Meccano parts to Sprocket Chains.

The very realistic Digger Bucket (Fig. 7) is of course designed principally for use in Meccano steam shovels, or mechanical navvies. The mouth of the Bucket measures about $1\frac{7}{8}" \times 2\frac{1}{4}"$, while the depth (over cutting teeth) is $2\frac{1}{2}"$. The bottom of the Bucket is mounted on hinged levers and normally is held in place by a sliding lever (the end of which may just be seen in the illustration) that engages with a slot in the front of the Bucket. A cord may be attached to the lever and on pulling this the floor falls open and so discharges the contents of the Bucket. If a small quantity of gravel or grain is available a model excavator fitted with the Digger Bucket can be used to load Hornby railway wagons, etc.

There are two types of Ship's Funnels in the Meccano system. One of these (part No. 138) is placed vertically on its base while the other is raked, i.e., when secured to a model, it lies at an angle to the vertical. Both are provided with two perforated lugs by means of

Parts in Class P: Special Accessories

Part No.		Prices s.	d.
41	Propeller Blades ... ... per pair	0	4
61	Windmill Sails ... ... 4 for	0	6
66	Weights, 50 grammes ... ... each	1	0
67	" 25 " ... ... "	1	0
101	Healds, for Looms ... ... doz.	0	9
104	Shuttles, for Looms ... ... each	5	0
106	Wood Rollers, complete with $4\frac{1}{2}"$ Rod and 2 Collars ... ... "	1	6
106a	Sand Rollers, complete with $4\frac{1}{2}"$ Rod and 2 Collars ... ... "	1	9
107	Tables for Designing Machines, Complete with Bush Wheel ... ... "	1	6
114	Hinges ... ... per pair	0	4
117	Steel Balls, $\frac{3}{8}"$ Diam. ... ... doz.	0	6
120	Buffers ... ... each	0	2
120a	Spring Buffers ... ... per pair	0	8
122	Miniature Loaded Sacks ... ... each	0	2
131	Dredger Bucket ... ... $\frac{1}{2}$ doz.	1	0
135	Theodolite Protractors ... ... each	0	3
138	Ship's Funnels ... ... "	0	3
138a-z	" " Raked; A series of 25 funnels in colours to represent leading shipping lines ... ... "	0	9
141	Wire Lines (for suspending Clock Weights) ... ... "	0	9
142	Rubber Rings, to fit 3" rim ... ... "	0	3
142a	Dunlop Tyre to fit 2" diam. rim... ... set of 4	1	6
142b	" " " 3" " " ... ... each	0	6
142c	" " " 1" " " ... ... "	0	3
142d	" " " $1\frac{1}{2}"$ " " ... ... "	0	4
149	Collecting Shoes, for Electric Locos ... "	1	6
150	Crane Grabs ... ... "	0	7
155	Rubber Rings, $\frac{5}{8}"$ int. diam. (will fit 1" Pulley) ... ... "	0	1
156	Pointers, $2\frac{1}{2}"$ overall, with boss ... ... "	0	4
157	Fans, 2" diam. with boss ... ... "	0	4
158a	Signal Arm, Home ... ... "	0	5
158b	" " Distant ... ... "	0	5
159	Circular Saws ... ... "	1	0
169	Digger Buckets ... ... "	2	0

which they may be bolted to any Meccano Strip or Plate. No. 138 is enamelled red and is designed for use in models of tramp steamers, etc. No. 138a is obtainable in twenty-five different colour-combinations to represent all the principal shipping companies. It is also provided with a miniature steampipe attached to the front of the funnel.

The Wire Line (No. 141) has been added to the system specially for the purpose of suspending the 18 lb. weight required to drive the Meccano Grandfather Clock (Instruction Leaflet No. 14), but naturally it can be used in any model where a very heavy load is required to be raised. The line is not suitable for use in small model cranes, owing to its stiffness.

The 3″ and 2″ sizes of the Dunlop Tyres will be familiar to the majority of Meccano boys, but the $1\frac{1}{2}$″ and 1″ sizes are recent additions. All four tyres are perfect miniature reproductions of the real thing and are specially made for Meccano Limited by the Dunlop Rubber Company Limited. The dimensions given represent their inside diameters and therefore the four tyres (parts Nos. 142a-d) fit the 2″, 3″, 1″, and $1\frac{1}{2}$″ Pulley Wheels respectively. They will lend a very realistic finish to any Meccano model motor car or motor cycle.

The 3″ Rubber Ring is designed to fit round the groove of a 3″ Pulley Wheel, and thus represent a rubber tyre for use in models of road vehicles. It is also sometimes employed to provide the frictional surface in Meccano Clutch mechanisms and frictional driving apparatus.

The most important use of the $\frac{5}{8}$″ Rubber Ring is found in the friction clutch incorporated in the Meccano model Motor Chassis (Instruction Leaflet No. 1). The clutch is reproduced in Fig. 10 and the Ring will be seen placed round the groove of a 1″ Pulley 1, which is secured to the Rod 2 and forms one portion of the clutch. On operation of the clutch pedal the other clutch member 3—a $1\frac{1}{8}$″ Flanged Wheel—may be moved to and fro and thus brought in or out of frictional contact with the Rubber Ring, which is driven continuously from the engine. Other functions of the part are its use for applying tension, for retarding a rotating shaft, or as a shock absorber in vibrating machinery, etc.

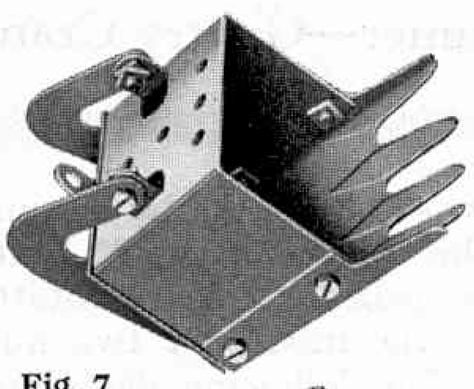


Fig. 7

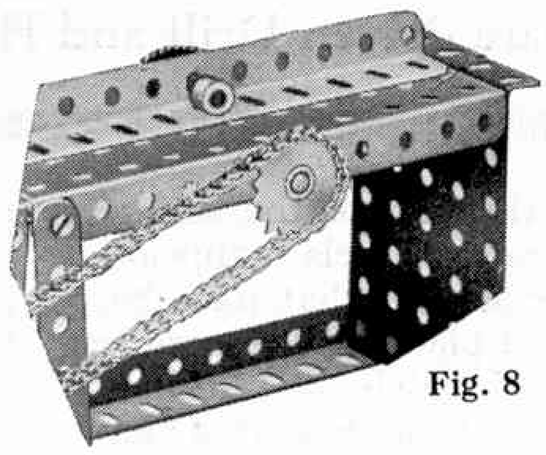


Fig. 8

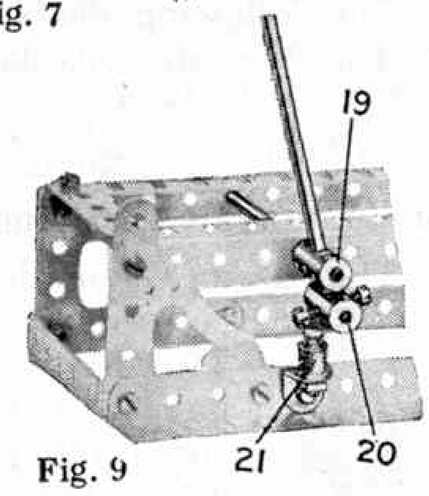


Fig. 9

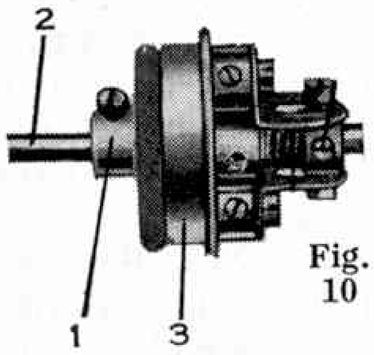


Fig. 10

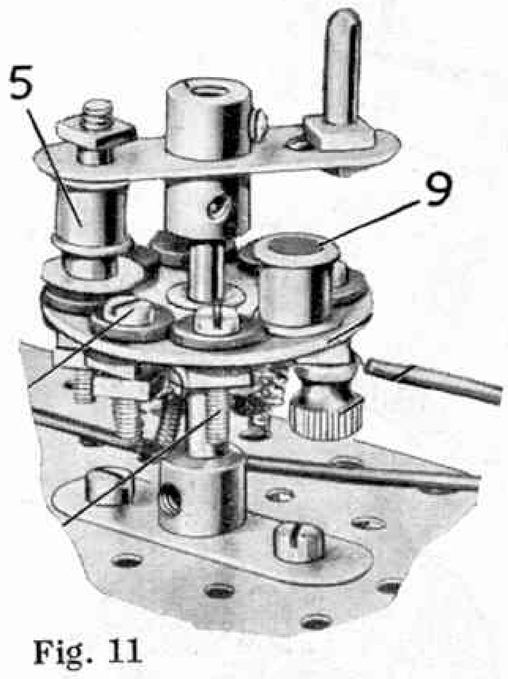


Fig. 11

Fig. 12

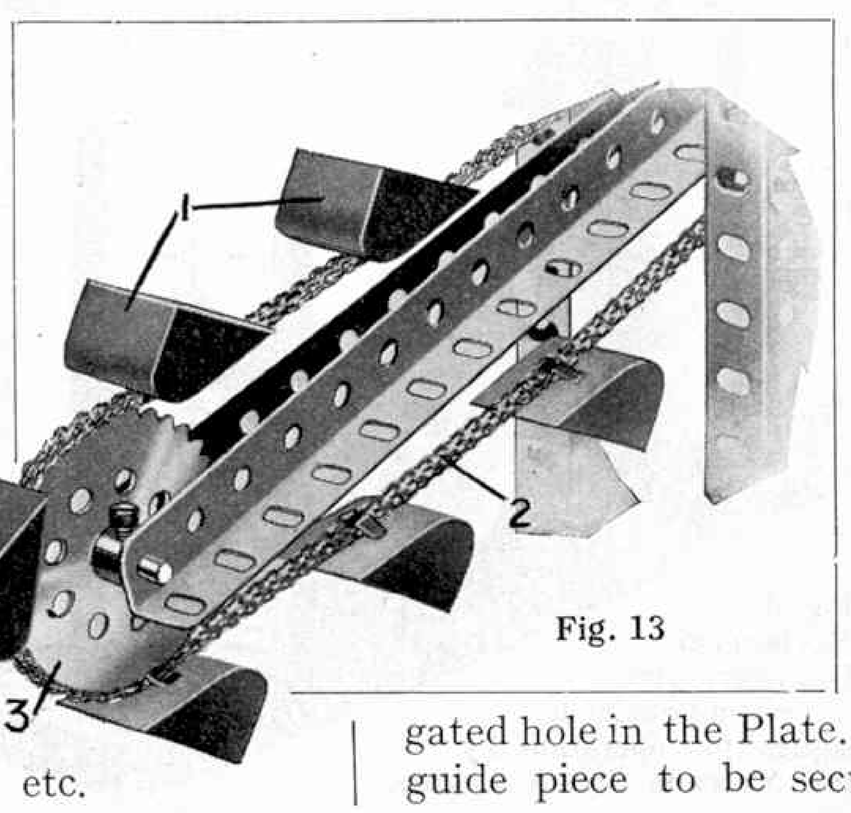


Fig. 13

The Crane Grab forms a valuable addition to small models of cranes, etc., for it facilitates the picking up and depositing of loads. As will be seen from Fig. 12, it consists of two jaws fitted with arms that are pivoted together and connected at their upper ends by short chains to a hook, which in turn may be attached to the main crane hook.

The only difference between the two types of Signal Arms (parts Nos. 158a and 158b) is, of course, the "fish-tail" on the "distant" Signal. They measure 3″ in overall length and are identical, except for the addition of a standard boss and set-screw, with the Hornby signal arms. Transparent red and green "glasses" are attached to the Signal Arms, and if a light is placed behind them a most realistic effect is obtained. A very fine model of a signal gantry may be built with the aid of these parts and ordinary Meccano Accessories, and if small electric bulbs are incorporated, both day and night signalling may be reproduced with perfect realism.

The Circular Saw is made of finest tempered steel, is $1\frac{1}{2}$″ in diameter, and is provided with a boss and set-screw. If driven at maximum speed from a Meccano Electric Motor, it will cut through thin pieces of wood. Hence it is possible to reproduce with Meccano, models of sawing machinery that can actually be put to practical use.

It has already been mentioned (in connection with Class D) that the $5\frac{1}{2}$″ × $2\frac{1}{2}$″ Flanged Plate has, in addition to the usual perforations, a slot 2″ long, and a hole $\frac{5}{8}$″ × $\frac{3}{16}$″ near its centre, for use in connection with the Circular Saw. In Fig. 8 we reproduce an illustration that appeared in the May 1929, "*M.M.*," showing the Flanged Plate and Circular Saw used in conjunction with each other. The Circular Saw is secured to the Sprocket Wheel shaft, and its blade, which can just be seen above the Angle Girder that forms the guide piece, protrudes through the slot. The Girder is held in place by the Collar shown, and the latter is secured on the shank of a bolt passed through the elongated hole in the Plate. This elongated hole allows the guide piece to be secured in different positions.

New Meccano Models

Racing Seaplane—Steam-driven Drill and Hammer—Gantry Crane—Clockwork Lorry

IT is exactly two years since the first of the series of articles entitled "New Meccano Models" appeared. Since then the twenty-three articles that have been published have been the means of placing before readers no less than 130 new and original models, in addition to the various "super" and special models that have appeared from time to time. The series is proving a great success and will be continued as a regular monthly feature throughout the year. We trust that the forthcoming articles will prove of even greater interest and assistance to model-builders than those that have appeared in the past.

Those who have followed the previous "New Meccano Models" articles will have noted that the great majority of models described have been of a comparatively simple nature. It should not be thought however, that their interest in consequence is confined only to those constructors who possess small Outfits, as ingenious and novel features and movements will be found incorporated in many of the simpler models, and even long-experienced model-builders are sure to gain some helpful model-building hints by following the series.

Racing Seaplane

Fig. 1 shows a diminutive model of the famous seaplane "*S6*," the victor in the last Schneider Trophy air race and holder of the world's air speed record.

The fuselage of the model seaplane consists of four $5\frac{1}{2}''$ Strips bolted at each end to Double Brackets. The Strips should be curved outwards slightly to give a "streamlined" appearance to the model. Each of the "floats" consists of a $5\frac{1}{2}''$ Strip slightly bent and secured to the fuselage by $2\frac{1}{2}''$ Strips and Angle Brackets. A further $2\frac{1}{2}''$ Strip is secured between the floats at the front to hold them rigid. The wings, which are built up of $2\frac{1}{2}''$ Strips bolted to $1\frac{1}{2}''$ Strips, are secured in position by Angle Brackets.

Two Trunnions form the tail-plane, while the rudder is represented by a Flat Trunnion held to the fuselage by Angle Brackets and $\frac{3}{8}''$ Bolts. In order to mount the Flat Trunnion centrally it is necessary to space it from the Angle Brackets by a number of Washers slipped on to the shanks of the $\frac{3}{8}''$ Bolts. The $2\frac{1}{2}''$ Strip forming the propeller is free to rotate on a $\frac{3}{8}''$ Bolt that is secured to the model by two nuts.

The following parts are required in the construction of the Meccano Seaplane:

6 of No. 2; 12 of No. 5; 2 of No. 6a; 2 of No. 11; 12 of No. 12; 34 of No. 37; 3 of No. 37a; 6 of No. 38; 2 of No. 111c; 1 of No. 126; 2 of No. 126a.

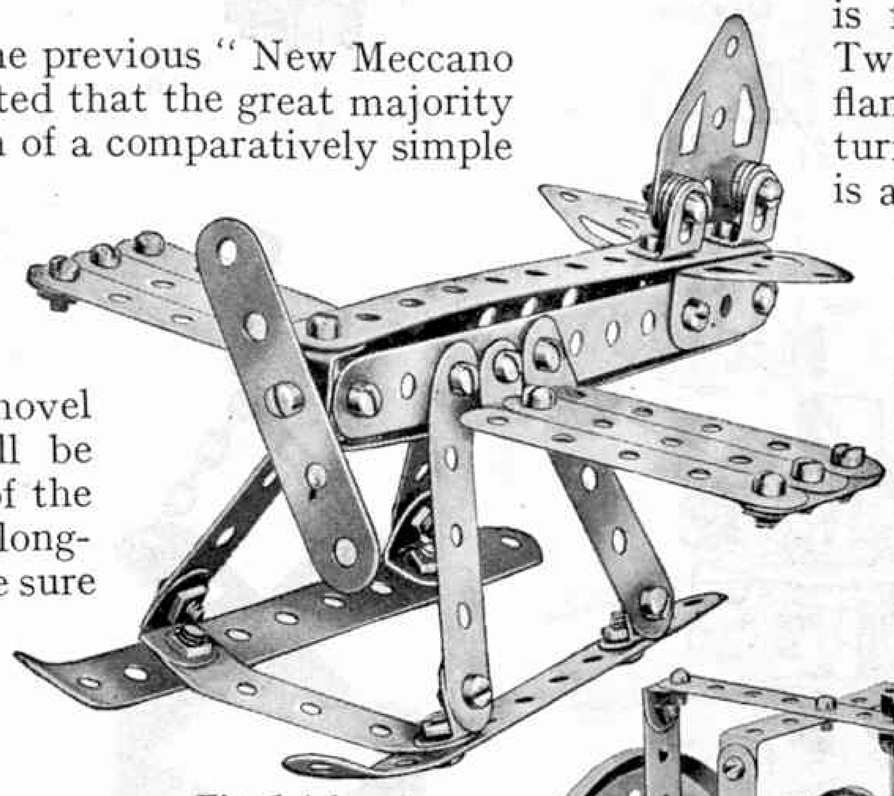


Fig. 1 (above). The famous Supermarine Seaplane "*S6*" in miniature.

Fig. 2 (right). Model Drilling Machine driven by a Meccano Steam Engine.

Steam-operated Drilling Machine

The base of the model Drilling Machine shown in Fig. 2 is formed from a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate. Two Flat Trunnions are secured to the side flanges of this Plate and two $5\frac{1}{2}''$ Strips are in turn bolted to the Trunnions. A Trunnion is also bolted to the surface of the Plate and to this is attached a further $5\frac{1}{2}''$ Strip which supports a $3\frac{1}{2}''$ Strip at its upper end. A $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip is secured between the vertical $5\frac{1}{2}''$ Strips and this is also bolted to the horizontal $3\frac{1}{2}''$ Strip. A second Double Angle Strip secured between the two $5\frac{1}{2}''$ uprights, carries a Flat Trunnion and a Double Bracket, the former being used as a journal for a $3\frac{1}{2}''$ Rod. The latter carries a 3" Pulley which takes up the drive from a 1" Pulley on the secondary shaft of the steam engine, while the Trunnion forms a bearing for the drill. The drive is led to the drill shaft by cord slipped round a 1" Pulley on the flywheel shaft, passed over two Pulleys which revolve idly on the transverse shaft, and finally placed round the groove of a further 1" fast Pulley on the drill shaft.

The completed drill is secured to the Steam Engine by means of a $5\frac{1}{2}''$ Strip that is bolted to the end flange of the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Plate and to one side plate of the Engine, and also by a $2\frac{1}{2}''$ Strip secured to the side of the base plate.

In order to build this model the following parts will be required:—

4 of No. 2; 1 of No. 3; 1 of No. 5; 1 of No. 11; 2 of No. 12; 3 of No. 16; 1 of No. 17; 2 of No. 19b; 4 of No. 22; 1 of No. 24; 5 of No. 35; 27 of No. 37; 2 of No. 48a; 1 of No. 52; 1 of No. 126; 2 of No. 126a; Steam Engine.

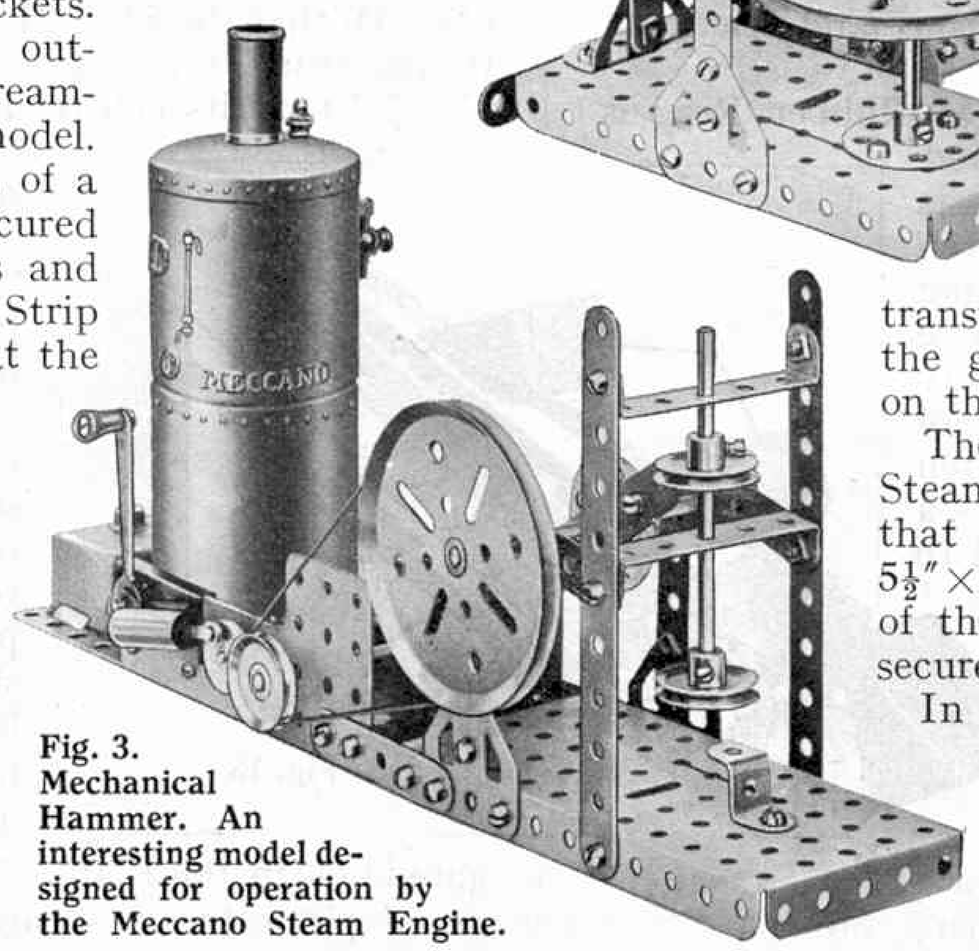


Fig. 3. Mechanical Hammer. An interesting model designed for operation by the Meccano Steam Engine.

Mechanical Stamp or Trip Hammer

Fig. 3 depicts a model mechanical hammer driven by the Meccano Steam Engine. To build the model, two $2\frac{1}{2}$" Strips are secured to a $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flanged Plate by means of Flat Trunnions and $2\frac{1}{2}$" Curved Strips are bolted to their upper ends. The Curved Strips are bolted to two $5\frac{1}{2}$" Strips which support two Double Angle Strips forming bearings for a $3\frac{1}{2}$" Rod carrying two 1" Pulleys. A $3\frac{1}{2}$" Rod is journalled in the Curved Strips, and carries a 3" Pulley and a Bush Wheel to which is bolted a $2\frac{1}{2}$" Strip. The Rod is held in place in its journals by a 1" Pulley.

The 3" Pulley is driven by means of cord from a 1" Pulley on the engine secondary shaft, and as the Rod rotates the ends of the Strip secured to the Bush Wheel strike the underside of the upper Pulley on the vertical Rod, thus operating the hammer.

The model comprises the following parts :—

2 of No. 2 ; 2 of No. 3 ; 5 of No. 5 ; 1 of No. 19b ; 3 of No. 22 ; 1 of No. 23 ; 1 of No. 24 ; 21 of No. 37 ; 2 of No. 48a ; 1 of No. 52 ; 2 of No. 90 ; 1 of No. 124 ; 2 of No. 126a ; Steam Engine.

Steam-driven Gantry Crane

A working model crane never fails to fascinate the Meccano boy, but when the crane is driven by a complete miniature steam power plant, the interest is increased considerably. Both the hoisting and travelling movements of the model Gantry Crane illustrated in Fig. 4 are operated by the Meccano Steam Engine which is mounted on the gantry.

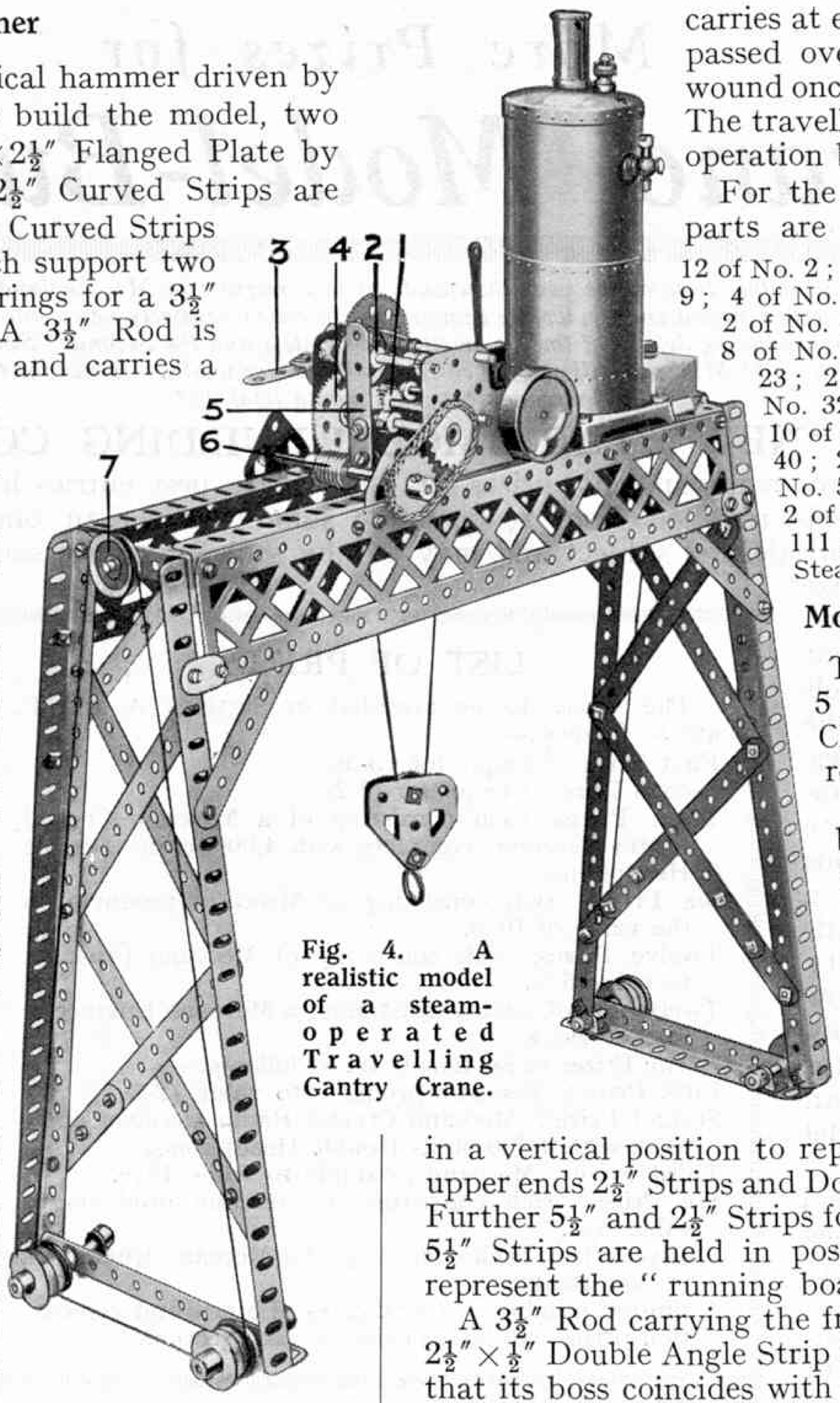


Fig. 4. A realistic model of a steam-operated Travelling Gantry Crane.

The end frames of the gantry each consist of two $12\frac{1}{2}$" Angle Girders bolted at the base to a $5\frac{1}{2}$" Angle Girder and at their upper ends to a $2\frac{1}{2}$" Strip, and the resulting structures are braced with Strips as shown. Two horizontal $12\frac{1}{2}$" Girders are bolted between the end frames and a Braced Girder is secured to each.

The Steam Engine should next be bolted in position and the Gears assembled as follows. A $\frac{1}{2}$" Pinion 1 on the secondary shaft of the Steam Engine meshes with a 57-teeth Gear on the hoist shaft, the cord from which passes round the 1" fast Pulley 2 to the single-sheave pulley block built up from Flat Trunnions. The 57-teeth Gear may be disengaged from its Pinion by means of the lever 3 which carries a bolt, the shank of which engages between two Collars on the hoisting spindle.

The shaft of the 57-teeth Gear 4 carries a 1" Sprocket which drives a further Sprocket on a $3\frac{1}{2}$" Rod journalled in Flat Trunnions and carrying the Worm 6. This engages with a Pinion on the Rod 7 that extends the whole length of the gantry and carries at each end a 1" Pulley. Cord is passed over the 1" Pulleys and then wound once round each travelling wheel. The travelling mechanism can be set in operation by movement of the lever 5.

For the gantry crane the following parts are necessary :—

12 of No. 2 ; 6 of No. 5 ; 6 of No. 8 ; 2 of No. 9 ; 4 of No. 10 ; 6 of No. 12 ; 1 of No. 13 ; 2 of No. 15a ; 4 of No. 16 ; 4 of No. 17 ; 8 of No. 20b ; 3 of No. 22 ; 1 of No. 23 ; 2 of No. 26 ; 2 of No. 27a ; 1 of No. 32 ; 1 of No. 35 ; 61 of No. 37 ; 10 of No. 37a ; 5 of No. 38 ; 1 of No. 40 ; 2 of No. 48a ; 1 of No. 57 ; 10 of No. 59 ; 1 of No. 63 ; 6" of No. 94 ; 2 of No. 96 ; 2 of No. 99 ; 2 of No. 111 ; 2 of No. 111c ; 4 of No. 126a ; Steam Engine.

Motor Lorry

The Motor Lorry shown in Fig. 5 is driven by a Meccano Clockwork Motor fitted to the rear of the " chassis."

Two $12\frac{1}{2}$" Angle Girders are bolted to the side flanges of a $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flanged Plate and to these, $2\frac{1}{2}$" Strips are bolted to support a Sector Plate which forms the " bonnet," the front end of this Plate being secured to the chassis frame by Angle Brackets. Two $5\frac{1}{2}$" Strips are bolted in a vertical position to represent the cab, and to their upper ends $2\frac{1}{2}$" Strips and Double Angle Strips are secured. Further $5\frac{1}{2}$" and $2\frac{1}{2}$" Strips form the sides of the lorry and $5\frac{1}{2}$" Strips are held in position by Angle Brackets to represent the " running boards."

A $3\frac{1}{2}$" Rod carrying the front wheels is journalled in a $2\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strip to which is bolted a Crank so that its boss coincides with the centre hole of the Angle Strip. A 2" Rod is secured in the boss of the Crank and passed through the Flanged Plate, a reinforced bearing for this Rod being provided by a second Crank, the set-screw of which has been removed.

The lorry is steered by means of a Bush Wheel on the end of a $3\frac{1}{2}$" Rod journalled in a Double Bent Strip bolted to the $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flanged Plate. Cord is wound round the lower end of the Rod and tied to each end of the Double Angle Strip carrying the front road wheels.

The rear wheels are mounted on a $3\frac{1}{2}$" Rod journalled in Flat Trunnions and passed through the perforations in the sides of the Clockwork Motor in which the standard Motor spindle is normally journalled, the special Motor Pinion being secured on the $3\frac{1}{2}$" Rod by its grub-screw. Additional support for the Motor is provided by a $3\frac{1}{2}$" Rod passed through the sides of the lorry.

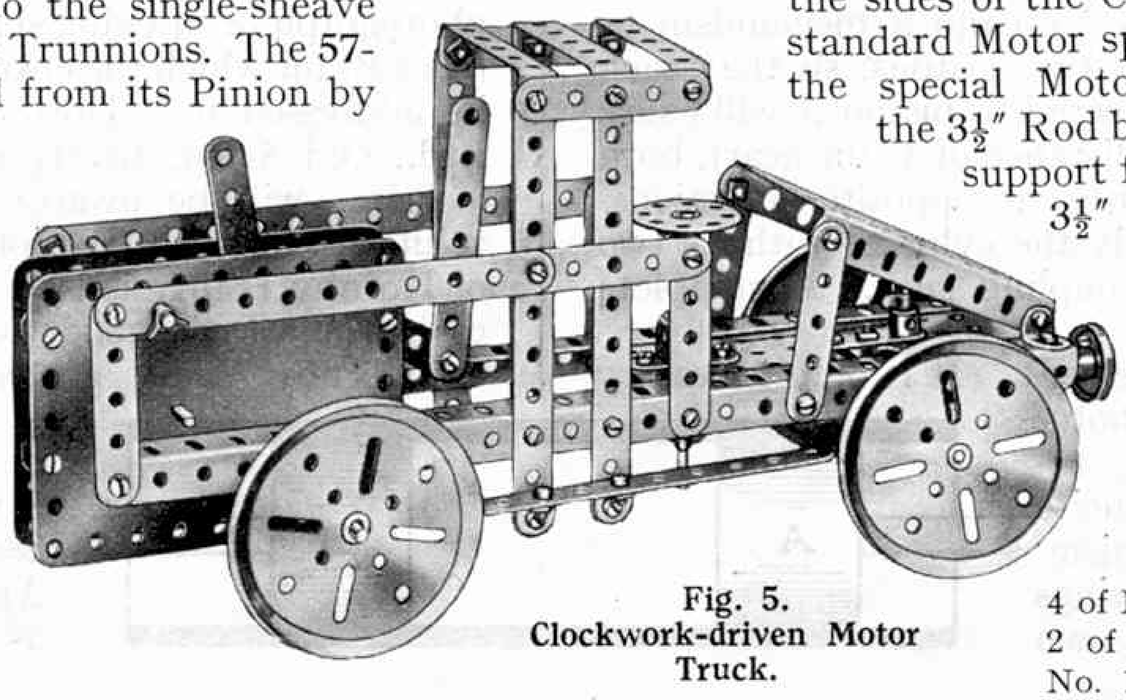


Fig. 5. Clockwork-driven Motor Truck.

The parts needed in building this model are :—

8 of No. 2 ; 1 of No. 3 ; 10 of No. 5 ; 6 of No. 10 ; 1 of No. 15 ; 1 of No. 15a ; 2 of No. 16 ; 1 of No. 18a ; 4 of No. 19b ; 2 of No. 22 ; 1 of No. 24 ; 12 of No. 35 ; 49 of No. 37 ; 3 of No. 38 ; 1 of No. 45 ; 4 of No. 48a ; 1 of No. 52 ; 1 of No. 54 ; 2 of No. 62 ; 2 of No. 111c ; 2 of No. 126a ; 1 Clockwork Motor.

More Prizes for Meccano Model-Builders!

In view of the fact that at this time of the year thousands of new recruits to Meccanoland are being enrolled, and many old Meccano boys are building with renewed energy, we are announcing below two entirely new contests, in which no less than 97 prizes are offered. We are also reproducing details of the "Christmas" Contest and the Second "Simplicity" Contest, which, although first announced in last month's "M.M.," are still open to entrants all over the world. Hence the prizes for which an "M.M." reader may compete this month total 211!

GRAND "NEW YEAR" MODEL-BUILDING COMPETITION

IN this contest we are offering many splendid prizes for the best Meccano models received from readers.

Models may represent any desired subject and may be constructed from any size of Outfit or number of parts, but it is wise to remember that simple, straightforward models are usually better than the more complicated structures. We advise intending competitors to try and incorporate in their models some ingenious use for a Meccano part, or a new Meccano movement. Models displaying originality in this way, no matter how simple in construction they may be, will stand a better chance of winning a prize than the most elaborate model submitted.

Entries received from readers residing in the British Isles will be divided into two Sections; Section A for readers over 14 years of age and Section B for readers under 14 years of age. Entries from readers Overseas will be grouped into Section C. The age of each competitor will be taken into consideration when making the awards, and prizes will be awarded for the best entries in each Section. Competitors may submit more than one entry but all the entries must be sent under the same cover.

LIST OF PRIZES

The Prizes to be awarded in Sections A and C are as follows:—

First Prize: Cheque for £3-3s.
Second Prize: Cheque for £2-2s.
Three Prizes, each consisting of a Meccano Crystal Radio Receiver, complete with 4,000 ohms Double Headphones.
Six Prizes, each consisting of Meccano products to the value of 10/6.
Twelve Prizes, each consisting of Meccano products to value 5/–.
Twelve Prizes, each consisting of a Meccano Engineers' Pocket Book.

The Prizes in Section B are as follows:—

First Prize: Meccano products to value £2-2s.
Second Prize: Meccano Crystal Radio Receiver complete with 4,000 ohms Double Headphones.
Third Prize: Meccano products to value 10/6.
Six Prizes, each consisting of Meccano products to value 5/–.
Twelve Prizes, each consisting of a Meccano Engineers' Pocket Book.
A limited number of Certificates of Merit and consolation prizes will be awarded in each section.

Readers should send in clear photographs or good drawings of their models together with any written explanations that may be necessary. The following instructions must be followed closely: The competitor's age, name, and address must appear on the back of each photograph or sheet of paper used, together with the letter (A, B, or C) indicating the section for which the model is eligible, and the name of the competition ("New Year" Model-building Competition). Envelopes should be addressed "New Year" Model-building Competition, Meccano Ltd., Old Swan, Liverpool.

Any model submitted must be the competitor's own unaided work, both in design and construction, although photographs or drawings need not be his own work. Actual models must not be submitted.

Closing dates:—Sections A and B not later than 31st January, 1930; Section C, 30th April, 1930.

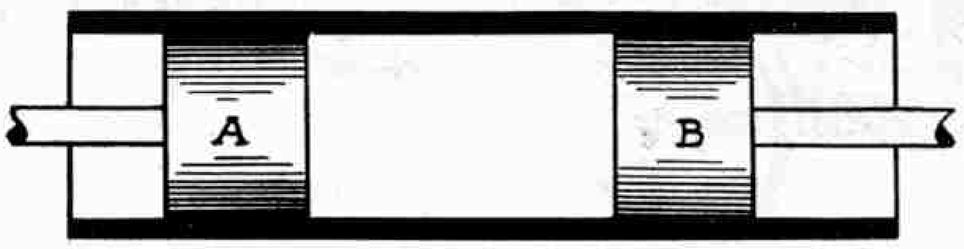
THIRD MECCANO "MECHANISM" CONTEST

In entering this contest competitors are asked to solve a problem that might be met in certain specialised engineering practice, and many handsome prizes are offered for the best solutions submitted.

The accompanying diagram shows two pistons, A and B, working in a cylinder. Piston A has a stroke of 3". The problem is to design in Meccano a mechanism or coupling gear connecting the two pistons, so that each stroke of the piston rod connected to piston A will cause piston B to move through a distance of 4" (or near), both pistons moving simultaneously in opposite directions.

Competitors need build only the cylinder with its two pistons and the necessary coupling gear. A complete machine is not required.

Actual models must not be sent. It is only necessary to submit either a clear photograph or a good drawing, together with a brief but concise explanation of the mechanism. Neither photographs nor drawings need be the competitor's own handiwork but it is absolutely essential that the mechanism itself is his own unaided work.



Entries will be divided into two sections: Section A, for readers residing in the British Isles; Section B, for readers residing Overseas. The competitor's age, name, and address must be written clearly on the back of each photograph or drawing sent in, together with the Section (A or B) for which the entry is eligible. Envelopes should be addressed to "Third Mechanism Contest," Meccano Ltd., Old Swan, Liverpool.

Prizes will be awarded to the senders of the best solutions in each Section as follows: First, Meccano or Hornby Train goods to value £1-1s.; Second, Meccano or Hornby Train goods to value 15/–. Third, Meccano or Hornby Train goods to value 10/6. A number of consolation prizes will also be awarded in each section.

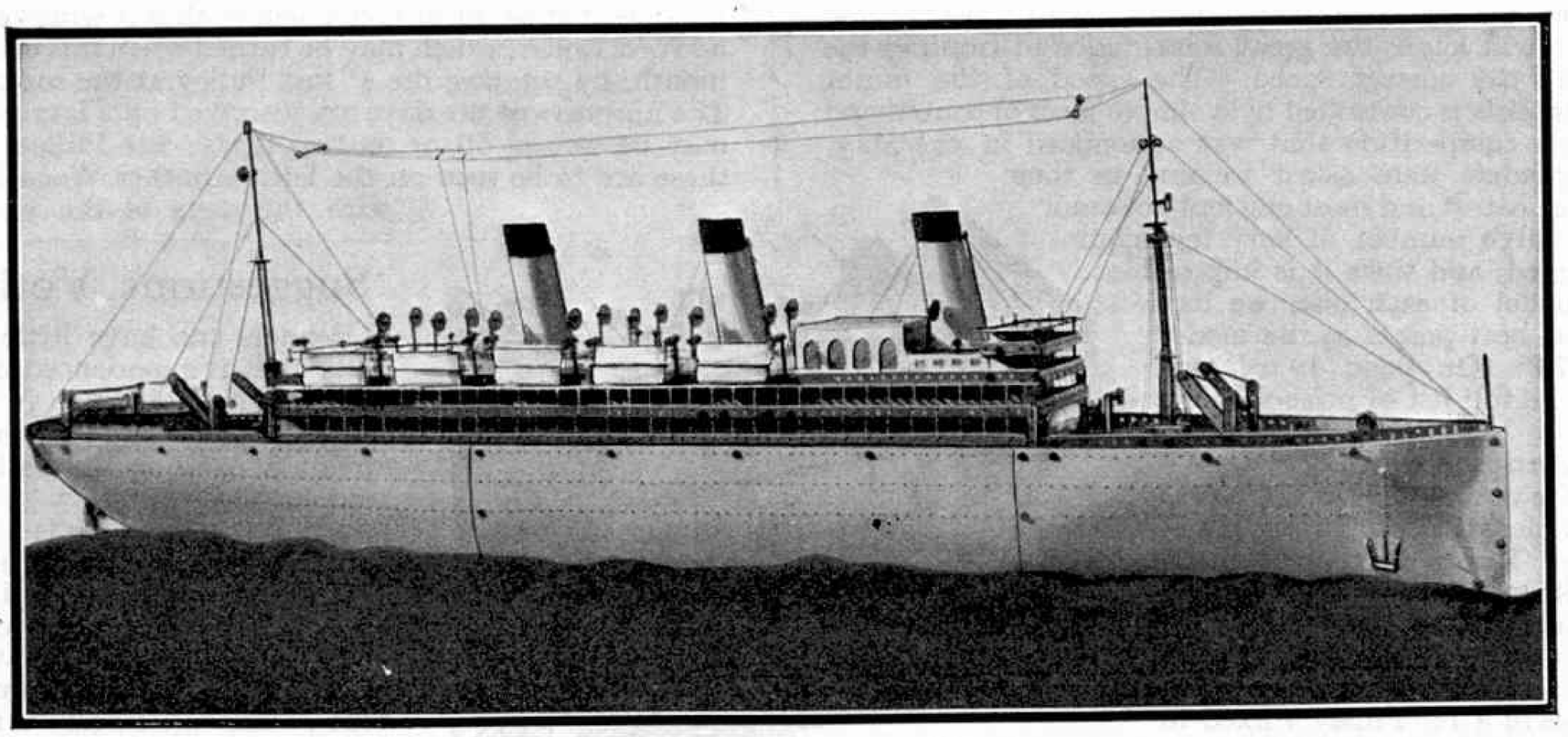
Closing dates: Section A, 28th February; Section B, 30th April. Entries should be posted as early as possible.

THERE IS STILL TIME TO ENTER THE "CHRISTMAS" COMPETITION!

Full particulars of the Grand Christmas Model-building Competition were published in the *"M.M."* last month, but we take this opportunity of reminding intending competitors that they still have a month—or perhaps more in the case of Overseas entrants—after the receipt of this issue, in which to prepare and enter their models. The closing dates are : for Home Sections, 31st January ; Overseas Section, 30th April.

In this contest we offer a number of splendid prizes for the most original models submitted. Any number of parts may be used, but competitors should remember that a simple well-built model stands a far greater chance of success than a badly designed and poorly constructed model, no matter how elaborate the latter may be. There are no entrance fees to pay or forms to fill in.

Set to work at once and build a good model. When it is finished take a photograph of it, or if this is not possible, make a clear drawing and send it in an envelope addressed to " Christmas " Model-building Competition, Meccano Ltd., Old Swan, Liverpool. Entries will be divided into three Sections, as follows : Section A for readers residing in the British Isles, and over 14 years of age ; Section B for readers residing in the British Isles under 14 years of age ; Section C for readers of all ages residing Overseas. The ages of all competitors will be taken into consideration when selecting the prize-winning entries.



A remarkable model of an Atlantic liner built by Frank Van Bulck, of Paris, from Meccano parts and cardboard. The decks, constructed from Angle Girders, possess a distinctly realistic appearance.

The principal prizes in Sections A and C are as follows : First, cheque for £3-3s. ; Second, cheque for £2-2s. ; Third, cheque for £1-1s. ; Six Prizes, each consisting of a Real Leather Presentation Pocket Wallet ; Twelve Prizes each consisting of Meccano products to value 5/–.

The principal prizes in Section B are : First, Meccano products to value £2-2s. ; Second, Meccano products to value £1-1s. ; Third, Meccano products to value 10/6. In addition, a number of consolation prizes will be awarded in each Section.

The following instructions must be followed closely : The competitor's age, name and address, together with the letter (A, B, or C) indicating the Section in which the model is entered, and the name of the contest, must be written clearly on the back of each photograph or drawing submitted. Photographs of prize-winning models become the property of Meccano Ltd.

If they are suitable many of the prize-winning models will be included in forthcoming Manuals and other Meccano publications that we have in mind, so that a successful competitor's model may be rebuilt again and again by Meccano boys residing in all parts of the world. This in itself will be regarded by most Meccano boys as sufficient recompense for the labour involved.

HAVE YOU ENTERED THE SECOND SIMPLICITY CONTEST?

Full details of the Second Simplicity Contest were announced last month, but we are again including them so that any readers who did not see the previous announcement may have the opportunity of competing. This contest is open, as its name implies, to small, simple models, but the competitor is not limited as to the particular parts that may be used in constructing his model.

It is important to remember that the prizes will be given to those models that combine ingenuity in design with simplicity in construction. Competitors should first choose a prototype and then construct a model of it with the smallest number of Meccano parts consistent with realism. No entry forms are needed and it is not necessary to send actual models. A clear photograph or a good drawing is all that is required. Special care must be taken to see that each sheet of paper or photograph submitted bears the sender's age, full name and address, and the name of the contest for which the entry is intended (" Second Simplicity " Competition).

Entries will be divided into three Sections : Section A, for competitors over 14 years of age residing in the British Isles ; Section B, for those under 14 years of age residing in the British Isles ; Section C, for readers of all ages residing Overseas.

Prizes will be awarded for the best entries from Sections A and C as follows : First, Meccano products to value £2-2s. ; Second, Meccano products to value £1-1s. ; Third, Meccano products to value 10/6. Six prizes, consisting of bound copies of the Complete Instruction Manuals.

The awards in Section B are : First, Meccano products to value £1-10s. ; Second, Meccano products to value 15/– ; Third, Meccano products to value 7/6. Six Prizes, each consisting of a " Meccano Engineers' Pocket Book." Also a limited number of consolation prizes and Certificates of Merit will be given in each Section.

Closing dates, for Sections A and B, 31st January. For Section C, 30th April. Photographs or drawings will be returned if a stamped addressed envelope is enclosed.

Suggestions Section

Edited by "Spanner"

The ideas printed in the "Suggestions Section" should prove a real help to thousands of Meccano enthusiasts. Often we receive letters from readers who describe how they have solved some knotty problem or evolved an interesting model after studying some of the ideas that have appeared. We shall always be pleased to receive further contributions for the "Suggestions Section." Cash payments are made for all Suggestions published (excluding those mentioned in the "Miscellaneous" Suggestions column). Contributions should be accompanied by clear photographs or drawings and should be addressed to "Spanner," c/o The "Meccano Magazine."

(179)—A New Meccano Centrifugal Governor

READERS who possess a gramophone and who have a good musical ear will know the great importance of running the turntable at the correct speed. The speed of the motor actuating the turntable is controlled by a simple form of centrifugal governor, and in a competition that was announced in the May, 1929, "*M.M.*," readers were asked to send in their conceptions of the neatest and most efficient governor of this type. A large number of very ingenious entries were received, and since it is impossible to illustrate a model of each one, we have combined all their best points in the model shown in Fig. 179. (On page 49 of this issue we publish the full list of prize-winners in this Contest).

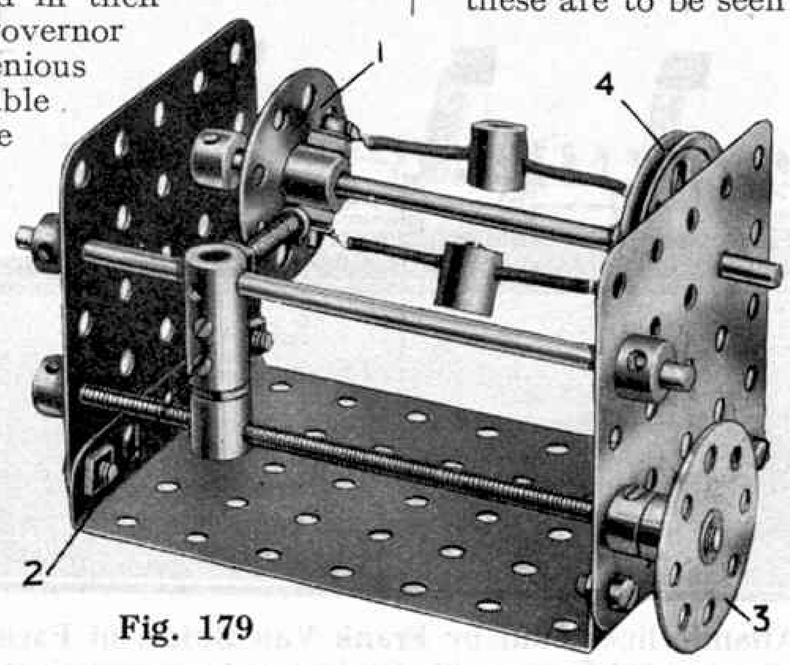


Fig. 179

The thin spring strips to which the "bobs" are attached in the actual device, are represented by short lengths of Spring Cord carrying Threaded Bosses that are secured in place on the Spring Cord by grub-screws, which are inserted in the ends of the Bosses and screwed home. One end of each length of Spring Cord is secured to bolts inserted in the set-screw holes of a 1½" Pulley 4 fixed to a 4½" Rod, and the other end is attached in a similar manner to a Bush Wheel 1. The latter must be free to slide on the Rod and therefore the bolts in its boss should not be allowed to touch the 4½" Rod.

As the speed of the governor Rod increases the bobs fly out under the influence of centrifugal force and so cause the Bush Wheel to move along the Rod until it comes into contact with the head of a ¾" Bolt, which thus imparts a braking effect and prevents any further increase in speed. If for any reason the speed drops, the bobs tend to collapse inward and so move the Bush Wheel away from the ¾" Bolt. The braking effect thus being eased, the device again picks up speed. These effects take place almost instantaneously, of course, so that the result is a steady rate of rotation.

The speed that the governor is expected to maintain may be varied by turning the Bush Wheel 3, which is attached to a Screwed Rod. On this Rod is mounted a Threaded Boss attached to a Coupling 2, which carries the ¾" Bolt and slides on a guide rod.

An improvement in the performance of the governor would result if the head of the ¾" Bolt were fitted with a small felt pad. This would allow for smoother running of the model.

(180)—Novel Meccano Calendar

(*K. Rogers, Colwick, Notts.*)

At this time of the year many individuals are faced with the problem of choosing New Year presents. Not so the Meccano boy, however, for he can make numberless useful articles with his Meccano that, when completed, may be presented to his relatives and friends. (A present of this type, tactically given in the right place, often produces certain welcome additions to one's Outfit !)

The Meccano calendar shown in Fig. 180 should form a very acceptable present, for it is both useful and ornamental. The construction of the model is fairly apparent from the illustration and we do not propose to go into details of the casing, since this is best modified to suit individual requirements.

The names of the months are neatly written out on a piece of paper of such a length that it wraps exactly once round a Wood Roller, which may be turned when it is desired to change the month, by rotating the ½" fast Pulley at the top right-hand corner. The numbers of the days are inscribed on a large strip of paper that may be wound off or on two Rods; the Pulleys for manipulating these are to be seen on the left. Another Wood Roller is provided with the days of the week.

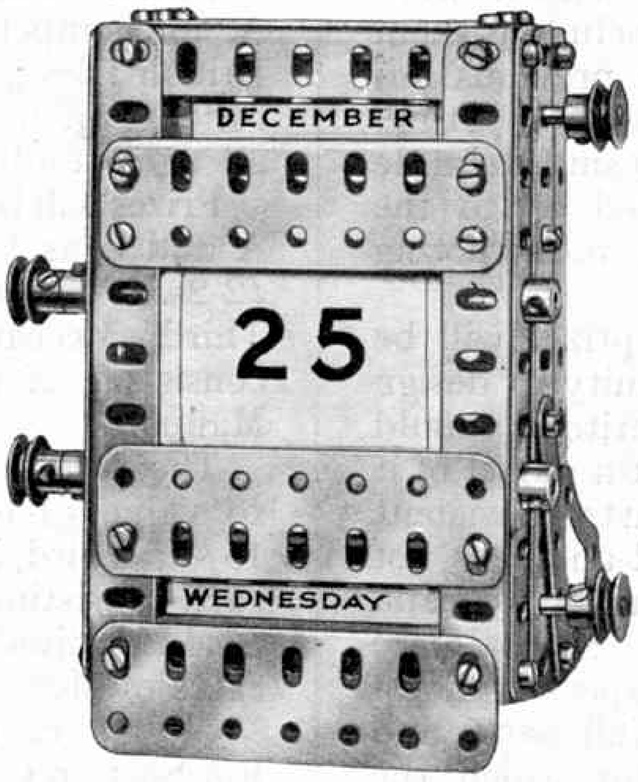


Fig. 180

Suggestions Voting Contest

Readers can have little idea of the difficulty that is experienced in choosing contributions for publication in the "Suggestions Section," for literally scores of suggestions stream in every week. All kinds of ideas are received, ranging from patent mouse traps and improved egg-whisks to epicyclic gears and internal expanding brakes!

It is with a view to aiding "Spanner" in his future selections and to ascertain whether Meccano boys have made good use of the ideas published during the past year that we announce below a new "Suggestions Voting" Competition. This Competition is essentially the same as the enormously popular one which was announced in the December, 1928, "*M.M.*," and which proved such a help in selecting the right ideas for 1929.

Competitors are asked to write down the four suggestions that they consider the best published during the twelve months January-December, 1929. It is only necessary for the voter to write on a post card the numbers of the four Suggestions, in their order of merit. By "suggestions" we mean those contributions published in this Section under the numbers 145 to 181 (i.e. thirty-seven in all, No. 145 being the first Suggestion in the January, 1929, "*M.M.*"), and those items printed under the heading "Miscellaneous Suggestions" and numbered M.33 (in the February "*M.M.*") to M.75 (forty-three in all).

Entries will be divided into two Sections, Section A for competitors residing in the British Isles, and Section B for competitors residing Overseas.

Every vote received in Section A will be recorded so that the suggestions may be classified in their order of popularity. The voter whose entry is then found to coincide most nearly with the result so obtained will be presented with a cheque for one guinea, while the voter who is next nearest to the general concensus of opinion will be awarded a cheque for half-a-guinea. Twelve voters who are "runners-up" will receive consolation prizes.

The same method will be adopted with the entries in Section B, and a duplicate set of prizes will be awarded to successful overseas boys. Thus it may happen that a totally different set of suggestions are voted the most popular in this Section.

A contributor who sent in a suggestion that is voted best in one or both of the Sections will receive a cheque for half-a-guinea and the three contributors whose suggestions are voted to be the next best in order will receive Certificates of Merit and consolation prizes.

Post cards must be addressed to "Suggestions Voting" Competition, Meccano Ltd., Old Swan, Liverpool. The closing date for Section A is 31st January, 1930, and for Section B, 31st March, 1930.

(181)—Single Suspension Grab

Grabs may be divided into two main classes, " single suspension " and " double suspension." In the latter there are two sets of ropes passing over the jib head pulleys down to the grab, but in the former there is only one. An excellent example of a double suspension grab is that fitted to the Meccano High Speed Ship Coaler (see Special Instruction Leaflet No. 2).

The mechanism by which the single suspension type of grab is controlled is ingenious yet simple, and it is therefore particularly suitable for reproduction in Meccano, as will be seen from the illustrations on this page. We are indebted to Messrs. Stothert and Pitt (Bath) for particulars relating to the prototype of the model.

Fig. 181 is a general view of the grab, whilst Fig. 181a shows the grab head partly dismantled. The construction of the jaws themselves should not present any particular difficulty since they are fairly apparent from the illustration. Each jaw consists of two $2\frac{1}{2}''$ Triangular Plates and one $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plate. The apices of the Triangular Plates are attached by lock-nutted bolts (see Standard Mechanism No. 263) to $1''$ Triangular Plates that are bolted rigidly to each end of a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip 1, and four connecting bars ($4\frac{1}{2}''$ Strips) are attached pivotally to the outer ends of the jaws by lock-nutted bolts.

The grab head gear is shown in detail in Fig. 181a, from which it will be seen that the side plates 2 carrying the operating mechanism are $2\frac{1}{2}''$ Flat Girders, which are connected together by $1'' \times \frac{1}{2}''$ and $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets 3, 3a. On the side plate shown detached, are fixed two $1''$ Triangular Plates that carry $1'' \times \frac{1}{2}''$ Angle Brackets 4 and 5, and to the Bracket 5 is secured a Double Bracket, with two Flat Brackets 6 bolted to it. Two Washers are placed between each Flat Bracket and the Double Bracket for spacing purposes.

The hooks 7 are composed of $2\frac{1}{2}''$ Strips bent to the shape shown in the illustrations and attached by means of $\frac{1}{2}''$ Bolts to 57-teeth Gears. The ends of the Strips are each fitted with a Pawl and a Flat Bracket. The catch 9 (Fig. 181a) is composed of a Centre Fork, held in the end bore of a Coupling, which also carries a Handrail Support 10 and a balance weight 11 consisting of a $1''$ Rod to the end of which is secured a Collar. The Gears are arranged to mesh with each other so that the hooks 7 lie at the same angle to the perpendicular, and the Rods on which they are secured should be quite free to turn in the side plates 2.

The Handrail Support 10 of the catch is mounted freely on the spindle of the right-hand Gear, and a $\frac{3}{8}''$ Bolt 8 is secured by double nuts to the Gear in the third hole from that in which the $2\frac{1}{2}''$ Strip is secured. Each hook is kept in the normal position by a piece of Spring Cord 12, one end of which is attached to the side plate and the other to a set-screw inserted in the boss of the 57-teeth Gear. Each piece of Spring Cord should be partially wound round the boss of the 57-teeth Gear before it is attached, so that its effort to come back to its normal state, and not its actual tension, is utilised to return the hooks. If it were used in the normal way, the tension would be too great for the purpose in view.

The connecting links between the grab proper and the grab head are attached by lock-nutted bolts to the $1''$ Triangular Plates, and the hoisting cord 16 is secured to the cross member 1. The cord is then threaded through the round hole in the lower guide 4, and a large knot made in it in such a position that when the jaws are open the knot rests on top of the guide. The cord may then be passed through the upper guide 5 and through the $1\frac{1}{2}''$ Pulley 15, which is termed the " suspender ring." This Pulley is hung by two cords from the jib head. The cords may be of any length to suit the height at which it is desired to effect discharge.

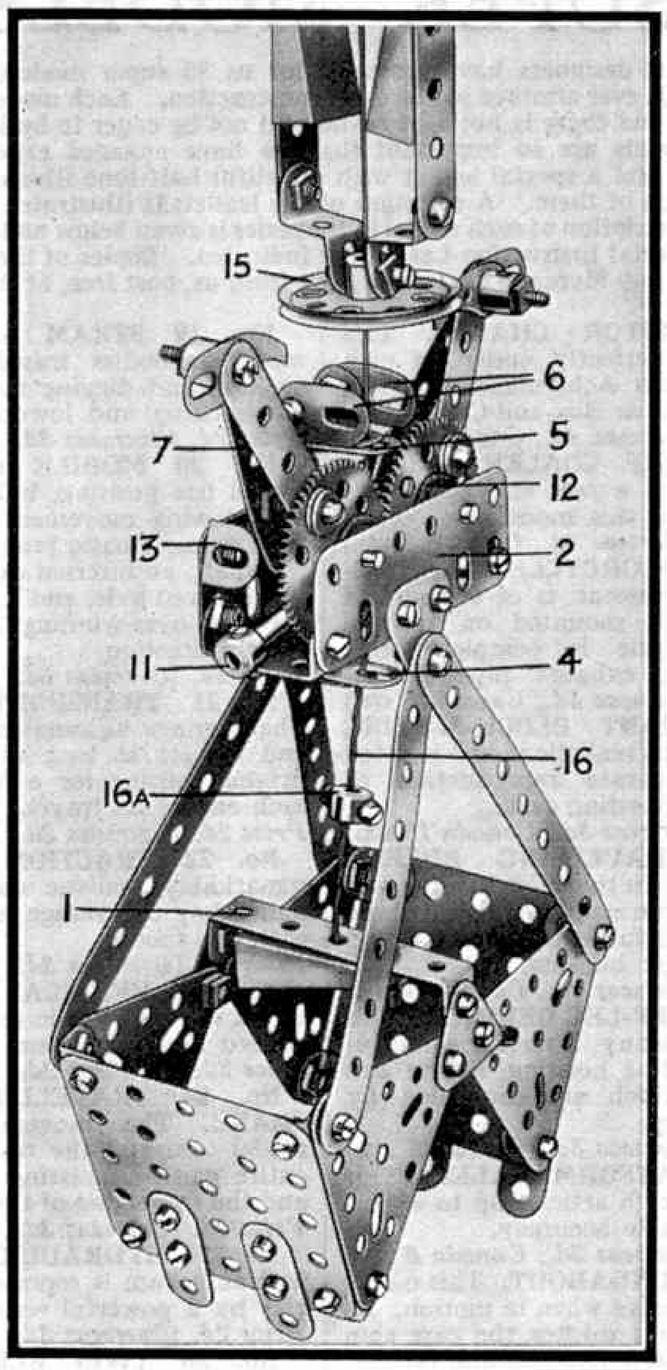


Fig. 181. Single Suspension Grab.

The operation of the grab is as follows: The grab should be assumed to be approaching the suspender with jaws closed. In this position the hooks are resting against the stops 6, the catch 9 is not touching the cord, and the knot is above the catch. The Pawls of the hooks 7 are forced over the rim of the suspender 15, thus causing the catch 9 to rise and bear against the hoisting rope. When the latter is allowed to unwind, the entire weight of the grab is borne by the hooks and the jaws open. As the grab opens to its fullest extent the knot in the hoisting cord passes to the underside of the catch 9.

To release the grab from the suspender, the hoisting rope is hauled in a trifle, thus causing the knot to bear against the underside of the catch. The latter bears, in turn, against the $\frac{3}{8}''$ Bolt 8 and the arms of the hooks fall back on the stops 13. The grab is now freed from the suspender and it can be lowered in the open position. On reaching the material to be removed, the hoisting rope is allowed to fall quite slack so as to give the weight of the Collar 16a a chance to pull the knot free from the catch, and so permit of the closing of the jaws when hoisting is commenced.

The two $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets 14 (Fig. 181a), by bearing against the connecting arms of the grab, serve to maintain the grab head in a horizontal position in relation to the jaws under all conditions of service.

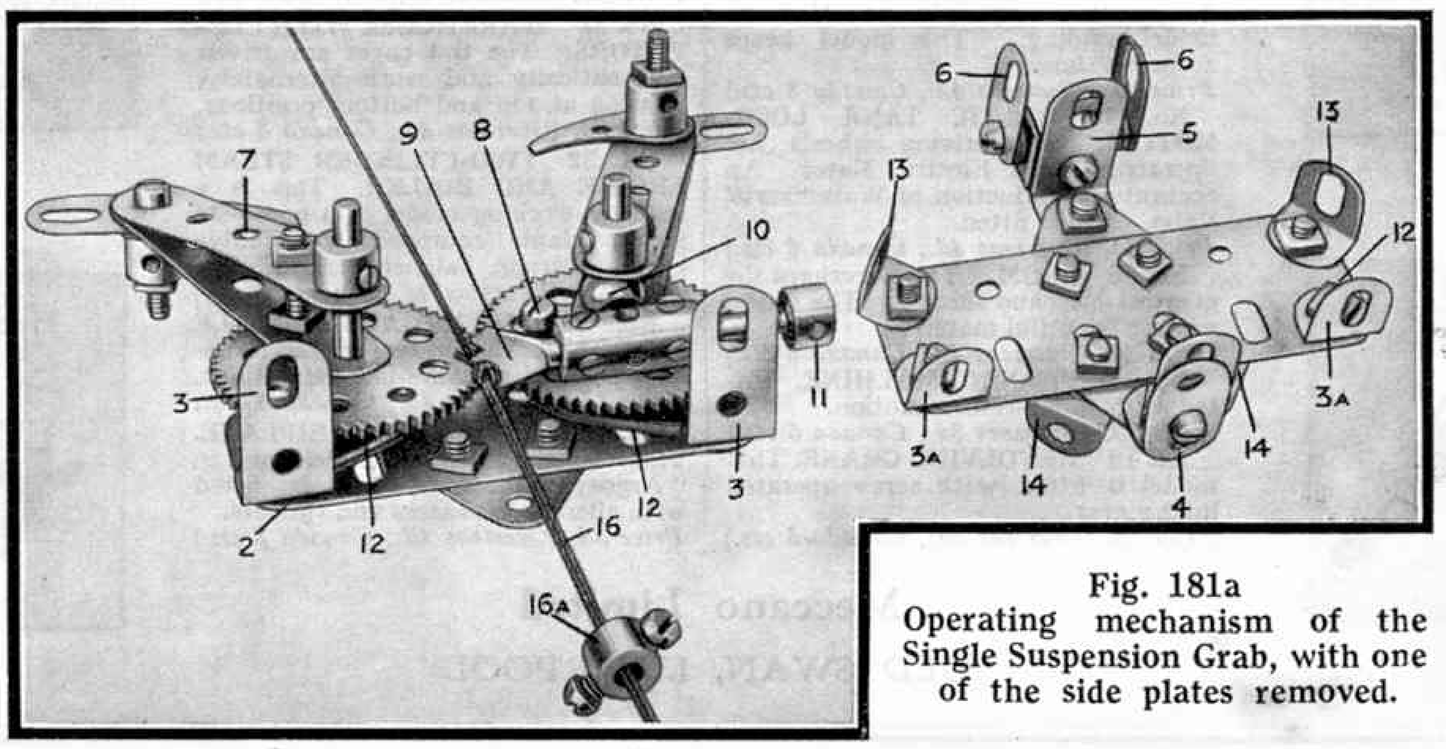


Fig. 181a
Operating mechanism of the Single Suspension Grab, with one of the side plates removed.

Miscellaneous Suggestions

Under this heading "Spanner" replies to readers who submit interesting suggestions regarding new Meccano models or movements that he is unable to deal with more fully elsewhere. On occasion he offers comments and technical criticisms that, he trusts, will be accepted in the same spirit of mutual help in which they are advanced.

(**M.74**). **Morse Practice Set.**—The idea underlying a device by J. Collier (London, S.E.9), is that instead of having a key with which to send the messages, the dots and dashes of the Morse Code are " written " down on a copper sheet with a Meccano Rod, both the sheet and Rod being attached by wires to the source of current supply. Whenever the Rod touches the copper, the circuit is completed and the buzzer sounds or a lamp lights for a long or short period, according to whether a dash or dot is written down. While this idea is certainly very ingenious it holds no advantages over the normal method of transmission, i.e. by key or " tapper."

(**M.75**).—**Meccano Filter Stand.**—Those who are interested in chemistry will know that a filter stand is always a useful acquisition, and they will accordingly be interested in the device suggested by L. Harrison (Nottingham). It consists essentially of a Rod secured vertically by means of a Bush Wheel to a Wheel Flange, which serves as a base. A $3\frac{1}{2}''$ Strip bolted to a Double Arm Crank is fixed in position on the Rod, and the holders for the funnels are mounted on its extremities. The holders each consist of a Wheel Flange, which is secured by a $\frac{3}{4}''$ Bolt, shank upward, to the end of the $3\frac{1}{2}''$ Strip in such a manner that the centre hole in the Wheel Flange is unobstructed by the Strip. Three other $\frac{3}{4}''$ Bolts are fixed in the remaining holes of the Wheel Flange, to support the funnel. The provision of a larger base would make the apparatus steadier.

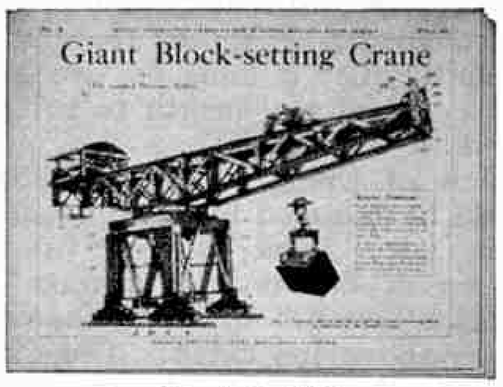
MECCANO

SUPER MODELS

Our expert designers have produced for us 35 super models that reach the highest pinnacle ever attained in Meccano construction. Each model in this series is a masterpiece and there is not a boy who will not be eager to build them all.

These models are so important that we have engaged expert engineers to describe them and a special leaflet with beautiful half-tone illustrations has been written for each of them. A selection of the leaflets is illustrated on this page.

A brief description of each model in the series is given below and the number and price of the special Instruction Leaflet are indicated. Copies of the leaflets may be obtained from any Meccano dealer or direct from us, post free, at the prices shown.



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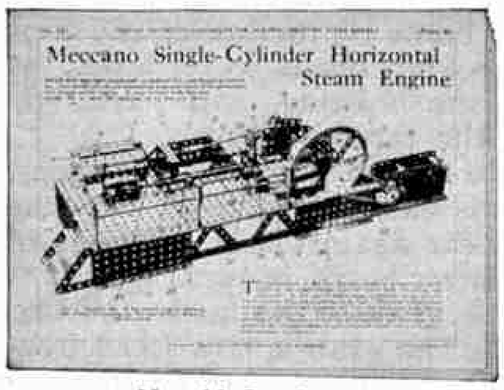

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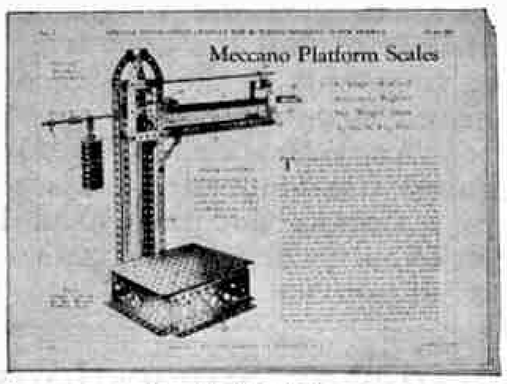
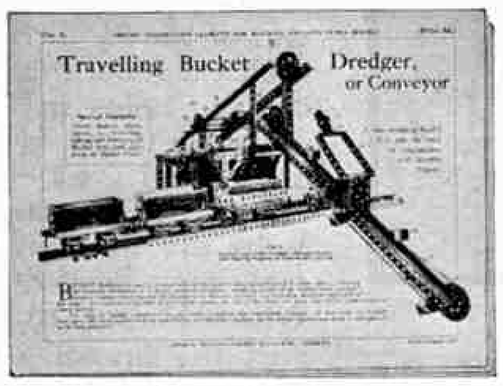


No. 7 Leaflet.

No. 1 Leaflet.

No. 25 Leaflet.



No. 5 Leaflet.

No. 1 MOTOR CHASSIS. This model runs perfectly under its own power. It has Ackermann Steering, Differential, Gear Box and Clutch, etc. *Price 3d. (Overseas 4d., Canada 8 cts.)*

No. 2 SHIP COALER. All the movements of a real ship-coaler are reproduced in this model. *Price 3d. (Overseas 4d., Canada 8 cts.)*

No. 3 MOTORCYCLE AND SIDE-CAR. The sidecar is of stream-line design and is mounted on springs. The motorcycle is complete with lamps, horn, exhaust pipes, etc. *Price 2d. (Overseas 3d., Canada 5 cts.)*

No. 4 GIANT BLOCK-SETTING CRANE. This realistic model is fitted with an accurate reproduction of Fidler's block-setting gear. *Price 6d. (Overseas 8d., Canada 15 cts.)*

No. 5 TRAVELLING BUCKET DREDGER. In this model trucks and wagons can run underneath the chute through which falls the material raised by the dredger buckets. *Price 2d. (Overseas 3d., Canada 5 cts.)*

No. 6 STIFF-LEG DERRICK. This model has many interesting movements, including hoisting, luffing and swivelling, which are controlled by suitable levers. *Price 2d. (Overseas 3d., Canada 5 cts.)*

No. 7 PLATFORM SCALES. This model will weigh articles up to 4½ lbs. with remarkable accuracy. *Price 2d. (Overseas 3d., Canada 5 cts.)*

No. 8 ROUNDABOUT. This model is most attractive when in motion. As the roundabout rotates the cars spin round and the horses rise and fall. *Price 2d. (Overseas 3d., Canada 5 cts.)*

No. 9 BAGATELLE TABLE. This is an interesting model that will give hours of fun to the players. *Price 2d. (Overseas 3d., Canada 5 cts.)*

No. 10 LOG SAW. In this model the saw is driven rapidly to and fro while the work table travels beneath it. *Price 2d. (Overseas 3d., Canada 5 cts.)*

No. 11 SINGLE-CYLINDER HORIZONTAL STEAM ENGINE. Fitted with balanced crankshaft, crosshead, and centrifugal governor. *Price 2d. (Overseas 3d., Canada 5 cts.)*

No. 12 STONE SAWING MACHINE. The model is equipped with adjustable work table and overhead trolley with self-sustaining chain hoist. *Price 2d. (Overseas 3d., Canada 5 cts.)*

No. 13 MECCANOGRAPH. This wonderful model will draw hundreds of beautiful designs. *Price 3d. (Overseas 4d., Canada 8 cts.)*

No. 14 GRANDFATHER CLOCK. A practical example of Meccano model-building. The model keeps accurate time. *Price 3d. (Overseas 4d., Canada 8 cts.)*

No. 15 BALTIC TANK LOCOMOTIVE. The driving wheels are operated by an Electric Motor. An accurate reproduction of Walschaerts' Valve Gear is fitted. *Price 3d. (Overseas 4d., Canada 8 cts.)*

No. 16 LOOM. This is perhaps the greatest Meccano success. The model weaves beautiful material. *Price 3d. (Overseas 4d., Canada 8 cts.)*

No. 17 PLANING MACHINE. Fitted with quick-return motion. *Price 2d. (Overseas 3d., Canada 5 cts.)*

No. 18 REVOLVING CRANE. This model is fitted with screw-operated luffing gear. *Price 2d. (Overseas 3d., Canada 5 cts.)*

No. 19 STEAM SHOVEL. This model embodies travelling, rotating, racking and digging movements, and jib hoisting and lowering gear. *Price 2d. (Overseas 3d., Canada 5 cts.)*

No. 20 MOBILE CRANE. This model has hoisting, luffing, travelling and slewing movements. It is fitted with an automatic brake on the hoisting shaft, an internal expanding brake on the front axle, and a limit switch to prevent over-winding of the jib in either direction. *Price 2d. (Overseas 3d., Canada 5 cts.)*

No. 21 TRANSPORTER BRIDGE. The carriage automatically travels to and fro for as long as the motor is driven, pausing for a few seconds at each end of its travel. *Price 2d. (Overseas 3d., Canada 5 cts.)*

No. 22 TRACTION ENGINE. A remarkably realistic model that will pull a boy of average weight. Fitted with two speeds. *Price 2d. (Overseas 3d., Canada 5 cts.)*

No. 23 VERTICAL LOG SAW. While the saws are in motion, the logs are fed slowly to them. *Price 2d. (Overseas 3d., Canada 5 cts.)*

No. 24 TRAVELLING GANTRY CRANE. The movements of this model comprise the traversing of the entire gantry, hoisting and lowering, and the traversing of the crane trolley. *Price 2d. (Overseas 3d., Canada 5 cts.)*

No. 25 HYDRAULIC CRANE. The hydraulic ram is represented realistically by a powerful screw mechanism. *Price 2d. (Overseas 3d., Canada 5 cts.)*

No. 26 TWIN ELLIPTIC HARMONOGRAPH. Some beautiful designs may be produced with this model. *Price 2d. (Overseas 3d., Canada 5 cts.)*

No. 27 DRAGLINE. This imposing model of a giant excavator is fitted with travelling, luffing, slewing, and dragging movements. *Price 3d. (Overseas 4d., Canada 8 cts.)*

No. 28 PONTOON CRANE. The movements of this model include the operation of the two hoisting blocks, slewing of the entire crane, and luffing. *Price 2d. (Overseas 3d., Canada 5 cts.)*

No. 29 HAMMERHEAD CRANE. This is a very realistic and powerful model, comprising traversing, hoisting and slewing motions. *Price 2d. (Overseas 3d., Canada 5 cts.)*

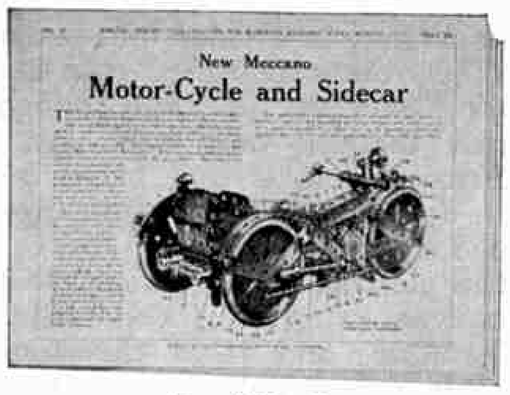
No. 30 BREAKDOWN CRANE. This model is equipped with travelling, slewing, luffing, and hoisting motions, and also is fitted with laminated springs, brakes, out-riggers, etc. *Price 3d. (Overseas 4d., Canada 8 cts.)*

No. 31 WAREHOUSE WITH ELEVATORS. The two cages are driven automatically and work alternately, pausing at top and bottom positions. *Price 3d. (Overseas 4d., Canada 8 cts.)*

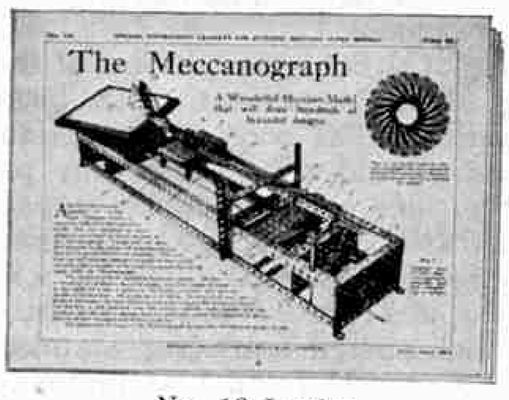
No. 32 TWO-CYLINDER STEAM ENGINE AND BOILER. This is a realistic working model of a complete steam plant, equipped with valve gear, governor, balanced cranks, etc. *Price 3d. (Overseas 4d., Canada 8 cts.)*

No. 33 SINGLE AND DOUBLE FLYBOATS. These two models represent popular pleasure-fair attractions. *Price 3d. (Overseas 4d., Canada 8 cts.)*

No. 34 THREE-ENGINE BIPLANE. This is a realistic model of an "Argosy" machine, and is fitted with ailerons, elevators and rudders. *Price 3d. (Overseas 4d., Canada 8 cts.)*



No. 3 Leaflet.



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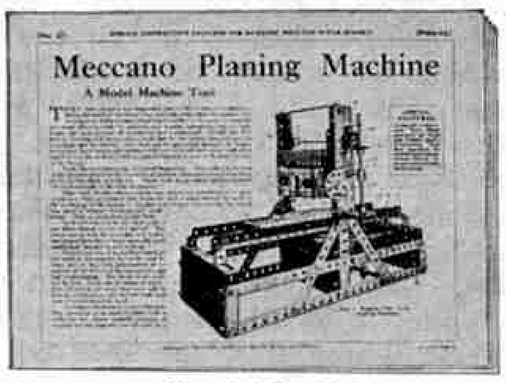


No. 17 Leaflet.

No. 6 Leaflet.

No. 19 Leaflet.

Meccano Limited

OLD SWAN, LIVERPOOL

A Model that Earns Money!

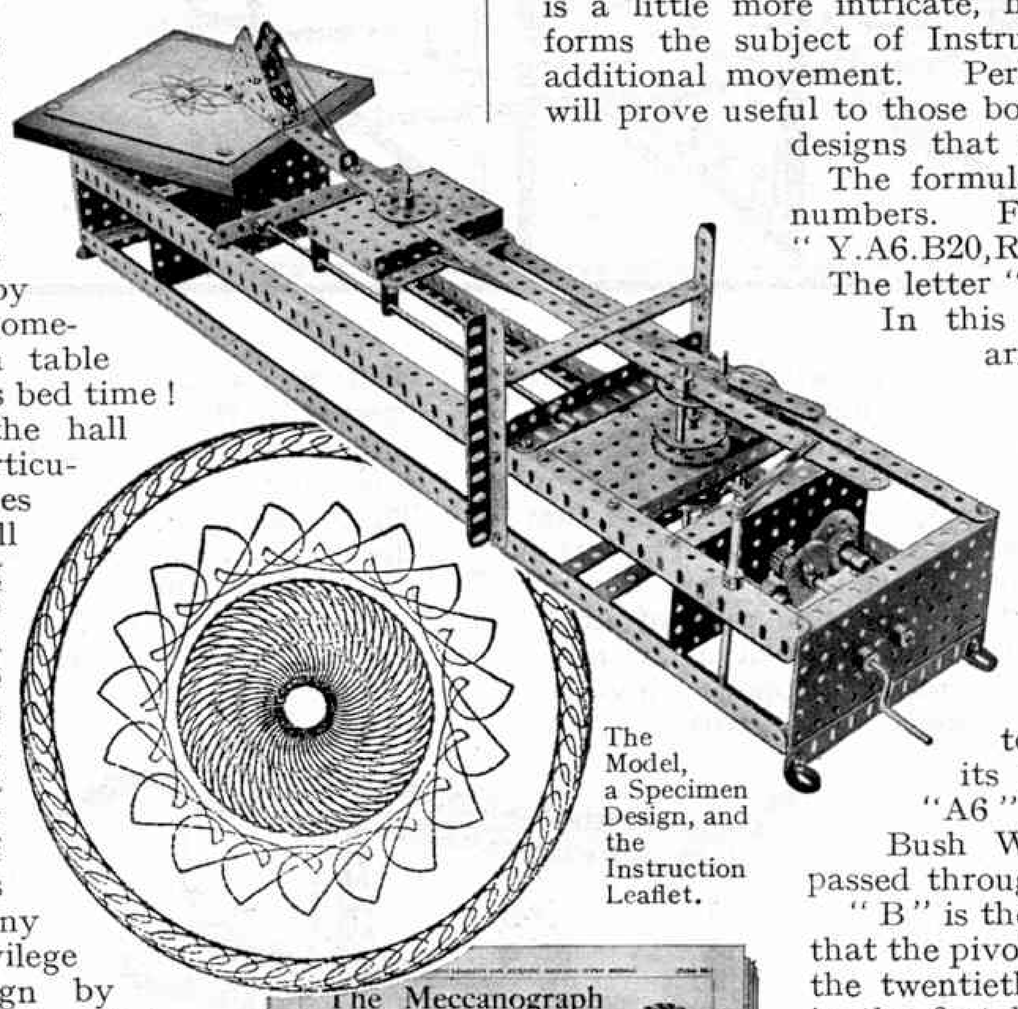
The Meccanograph at a Club Exhibition

By "Spanner"

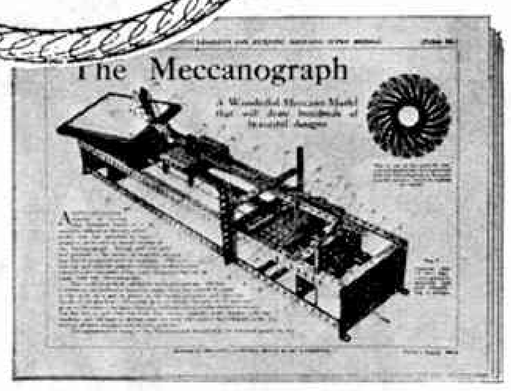
IT is a rule of mine to attend all Meccano Club exhibitions that take place within a reasonable distance. Apart from their attraction as an entertainment they are specially important to me as a means of collecting further ideas for the "Suggestions Section." Consequently, hearing at the last minute of an exhibition organised by one of the big Meccano Clubs in London, I wasted very little time before arriving on the scene.

The exhibition afforded ample vindication of the statement that "the best age to start Meccano is anywhere between 5 and 70." There were "Meccano boys" with school caps perched on the backs of their heads, others with grey hair, and a few with no hair at all! Even mothers and sisters had been hauled into the show, and from their expressions it was obvious that a few had just realised for the first time that Meccano was an educational hobby of very great value, and not merely something that litters up the dining-room table and keeps little Tommy up long past his bed time!

I had not progressed far down the hall before I found myself jammed in a particularly dense part of the crowd. All eyes appeared to be gazing towards a small table in the centre of the throng and peering over the heads of the people as well as I could, I soon found the centre of attraction to be a Meccanograph. Then, above the noise of working models and buzz of conversation, I heard a continual "chink, chink" of copper coins, and my past experience of Club exhibitions told me what was happening. On payment of one penny visitors were being allowed the privilege of producing a Meccanograph design by operating the machine with their own hands!



The Model, a Specimen Design, and the Instruction Leaflet.



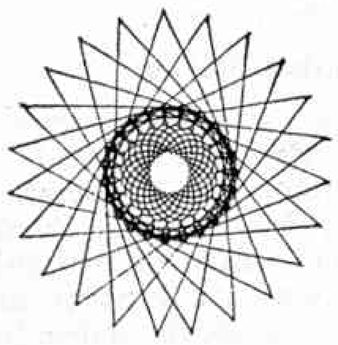
I soon identified the treasurer of the Club, for a Meccano boy standing close by wore a grin that appeared to grow wider as each "chink" of coin floated to his ears. Obviously it was the best music he had heard for a long time! I seized the opportunity to ask him whether the Meccanograph was a success financially.

"Rather!" he exclaimed. "Scarcely a single person leaves the exhibition without taking at least one design with him as a momento, and as you see we are charging a penny for each design. The visitors are allowed to set the machine for themselves if they wish, and so far the same design has not once been repeated."

"Was the model built jointly by the Club?" I asked.

"No, it is so simple that two or three members who only possess fairly small Outfits found that they had sufficient parts, and together they built the model in less than an hour."

This reminded me of the number of people who appear to think that, because the Meccanograph produces such varied and beautiful designs, it must necessarily be one of the most elaborate and costly of the Meccano models. As a matter of fact it is quite simple and easy to build, and all the parts required for its construction can be bought separately for slightly over 24/–. Boys possessing No. 4 or larger Outfits can build the model by adding only a few parts to their sets. Moreover, it does not require a Motor, although one could be fitted and used to operate the model provided that its speed was controlled very carefully with the aid of a Resistance Controller.



On the wall above the Meccanograph I noticed a number of specimen designs, each framed and finished in colours. Under each design two or three letters or figures were neatly inscribed. Noting my interest in these the Club Treasurer explained that if any visitor was particularly struck by any one of these designs, he could produce a copy of it for himself, one of the attendant Meccano boys having first made the necessary adjustments to the machine.

The formula employed to show how the designs might be reproduced is based on that adopted in the Meccanograph booklet that was published some years ago by Meccano Limited for use in connection with the first model Meccanograph. It is a little more intricate, however, for the new model, which forms the subject of Instruction Leaflet No. **13**, embodies an additional movement. Perhaps an explanation of the formula will prove useful to those boys who wish to keep a record of the designs that they produce.

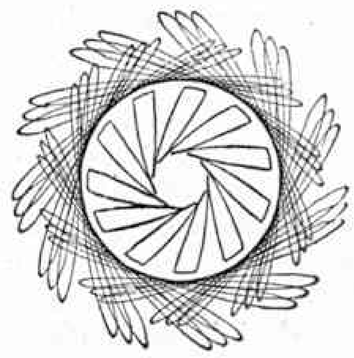
The formula consists of a series of letters and numbers. For instance, one design was marked "Y.A6.B20,R1.H1-3. 2 revs."

The letter "Y" indicates the gear arrangement. In this particular model three alternative arrangements were available and were known to the operators as X, Y, or Z; each provided different speed ratios in the table and crown head, and the alteration from one arrangement to another merely entailed changing the positions of two or three of the gears in the gear box. The connecting arm which pushes the carriage to and fro on the horizontal rods is referred to as "A," and the holes throughout its length are numbered. Therefore "A6" means that the pin secured to the Bush Wheel that operates the carriage is passed through the sixth hole in the arm.

"B" is the drawing arm and "B20,R1" means that the pivot pin on the carriage is passed through the twentieth hole in the arm and then inserted in the first hole on the right of the central hole in the carriage. "H" is the crown head, and "H1-3" tells the operator that pins are to be inserted in its first and third holes (the holes in the upper Bush Wheel of the crown head are numbered 1 to 8). "2 revs." means, of course, that the table must make two revolutions before the design is completed.

For some designs the carriage-operating arm "A" is disconnected, with the result that the carriage remains stationary on its rods and a transverse motion only is imparted to the drawing arm by the pin or pins in the crown head. A design produced in this way might be described by "Z.B8,17, L1.H1" (i.e. gear arrangement Z; writing arm to be placed so that its eighth hole is immediately opposite the central hole in the "bridge" through which the arm slides; carriage pin to be inserted in the seventeenth hole of the arm and in the first hole on the left of the central hole in the carriage. One pin only inserted in the crown head, and only one revolution of table).

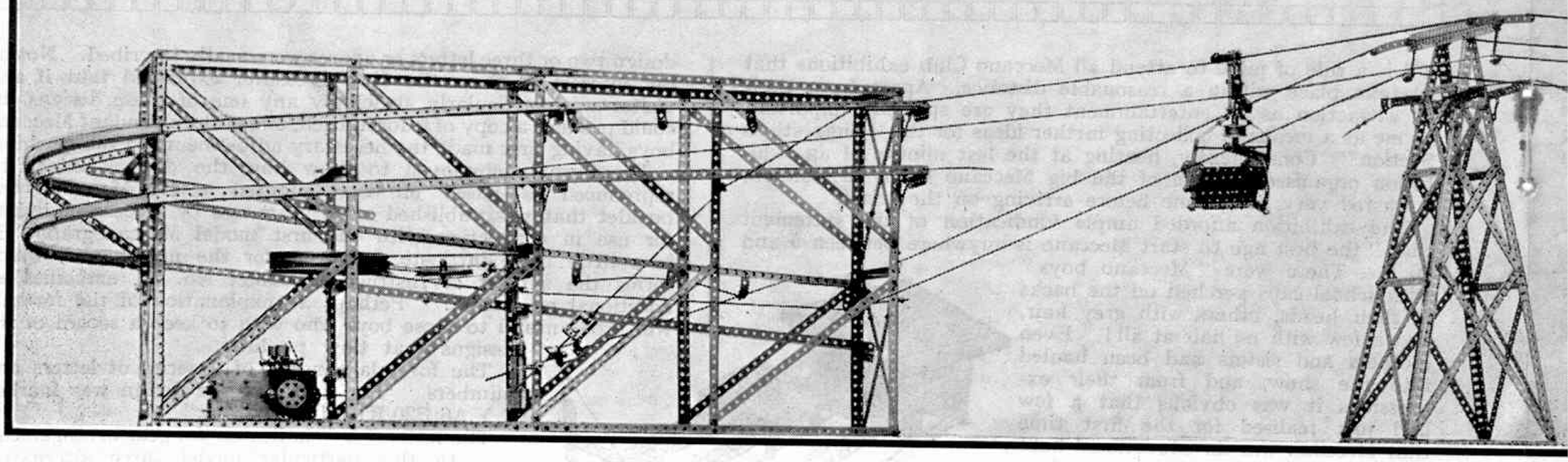
Again, in certain designs the carriage-operating arm may be disconnected, but a sliding motion imparted to the carriage by passing a pin *through* the writing arm "B" and into the crown head. Such a design might be indicated by "X.B1,16" (gear arrangement X; one pin to be passed through the first hole of the writing arm and inserted in the crown head; carriage pin to be passed through the sixteenth hole in the arm).



I left that Meccano exhibition with reluctance. Also with three beautiful Meccanograph designs, and minus threepence, which had gone to swell the Club funds.

(The Meccanograph Instruction Leaflet (No. 13) may be obtained from any Meccano dealer, price 3d., or direct from Meccano Ltd., Old Swan, Liverpool, price 3d. post free—*Editor*).

A Meccano Aerial Ro



IN an article on overhead transport by means of electric telphers in the November, 1929 "*M.M.*," we mentioned the many advantages that were to be gained from the adoption of this means of transport. Chief amongst these advantages is its comparative cheapness in first cost and operation, and also the fact that the installation occupies very little ground space. The latter is a particularly valuable feature as it permits of easy deposit on growing dumps of waste material or increasing piles of stock.

Another form of overhead transport is afforded by aerial ropeways. In its simplest form the installation of a ropeway involves merely the stretching of a cable between two points and the provision of buckets or conveyors that may be hauled along it. Hence it may be gathered that for many kinds of work it shows important advantages over even an electric telpher. Particularly is this the case in constructional works and in the disposal of waste and material from mines, where the installation is more or less temporary.

Ropeways are used for pleasure as well as for serious purposes. One interesting example is the ropeway at Rio de Janeiro, by means of which passengers make the ascent to the summit of the Sugar Loaf, a mountain that dominates the beautiful harbour on which the city stands. A trip on this novel aerial ropeway was described and illustrated on page 901 of the "*M.M.*" for November, 1928.

It is in connection with industrial purposes, however, that the greatest developments in ropeways are seen. In the South Wales coalfields for example, ropeways have been adopted extensively within a comparatively short time for disposing of the waste from mine workings. In this district many of the mines are situated in deep valleys, the sides of which are extremely steep. Obviously the shale, etc., cannot be deposited near the mine on account of the small space available, or on the hill side because of the danger of subsidence, and so the best dumping ground is the comparatively flat tops of the mountains, which means that the hauling of loaded "tubs" to the top would be a slow and laborious process.

By the installation of a ropeway, however, all difficulties are overcome, for the steepness of the hillside and the nature of the ground in cases where it would be impossible to lay a "tramway," form no obstacle to a ropeway.

Much of the credit for the improvements that have made ropeways of such great value in modern industry is due to R. White & Sons, of Widnes, Lancashire. On the often intricate and elaborate systems erected by this firm, the buckets that serve as carriers run on a wire cable of special design along which they are hauled by a lighter rope that is driven by an electric motor, or other power unit. They negotiate corners and angles without being removed from the carrier rope, and their contents may be tipped at any desired point along the route over which they travel. Practically all operations are automatic—the buckets even load themselves!—and a White aerial ropeway runs with a minimum of attention.

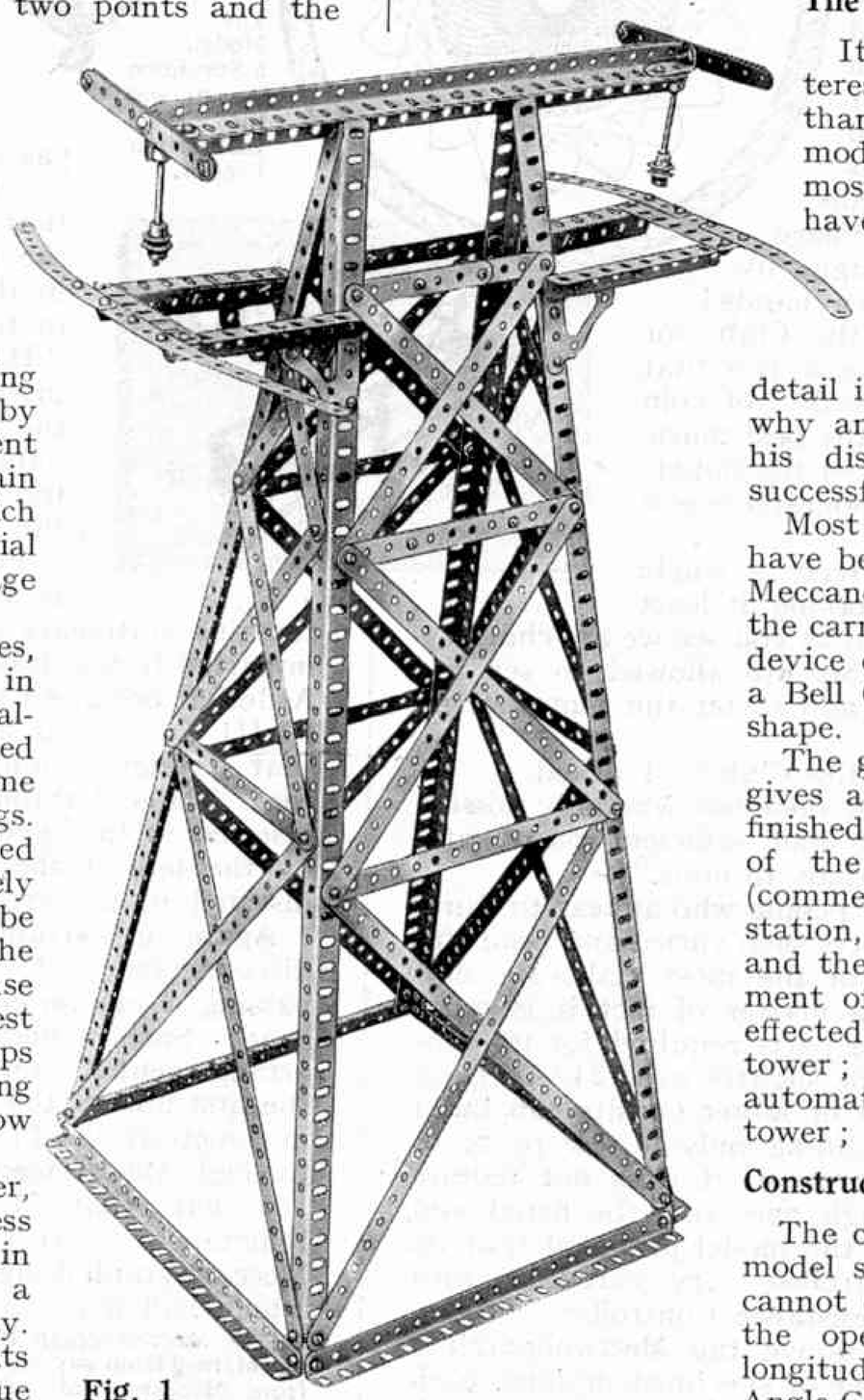


Fig. 1
One of the Supporting Towers.

The Meccano Model

It would be difficult to find a more interesting prototype for a Meccano model than a White Ropeway, and we believe the model described in this article is one of the most realistic and impressive models that have so far been built in Meccano. The model will require a good deal of space—the more the better—and much care must be taken in its construction. We shall describe every detail in full, however, and there is no reason why any Meccano boy who has the parts at his disposal should not make a perfectly successful model.

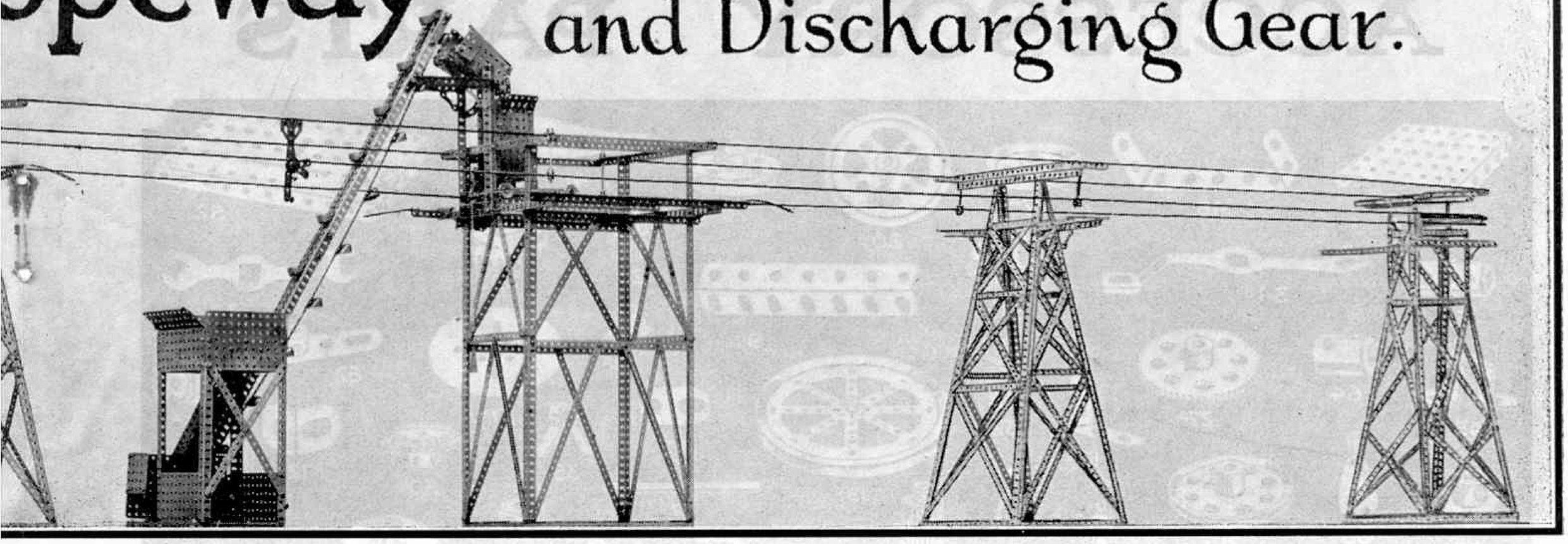
Most of the salient features of the prototype have been reproduced entirely with the aid of Meccano standard parts, with the exception of the carrier rope, hauling rope, and the gripping device on the bucket—the latter consisting of a Bell Crank and 1½" Strip filed to a certain shape.

The general view at the head of this article gives a good idea of the appearance of the finished model. To detail the essential features of the apparatus, the photograph shows (commencing from the left) the operating station, where the driving machinery is situated and the automatic engagement and disengagement of the hauling rope from the bucket is effected; the bucket itself; a supporting tower; the hopper and bucket conveyor; the automatic loading plant; another supporting tower; and finally the return tower.

Construction of the Operating Station

The construction of the various units of the model should be done systematically, and we cannot do better than commence by building the operating station (Fig. 3). The main longitudinal members each consist of two 18½" Angle Girders joined together by a 3" Strip, and each pair of members so formed is connected

...opeway with Automatic Pick-up and Discharging Gear.



at each end by 7½″ Angle Girders. The vertical members are composed of 18½″ Angle Girders, which should be spaced apart the distance indicated in the illustration.

The running rails 1 each consist of one 24½″ and one 18½″ Angle Girder overlapped seven holes and supported on the brackets 2, in an inverted position and slightly tilted, so that the rail section resembles an inverted " V." Each of the brackets 2 consists of a Flanged Bracket bolted by its shorter side to the vertical girders, and having its longer side extended by means of a 3½″ Strip overlapping four holes in the case of the two brackets at the left-hand end of the structure, and by 3½″ Strips overlapping five holes in the case of the remaining four. A 2½″ Angle Girder is added to each bracket for strengthening purposes. The running rail is laid on the brackets in the manner indicated in the illustration, and is retained thereon by two Flat Brackets, which are bolted on either side of the rail and bent so that the projecting portions bed flat on the bracket. The Flat Brackets are then attached to the brackets 2 by means of nuts and bolts.

The curved portion of the running rail is formed by four Channel Segments, bolted rigidly together. The connection between the straight and curved sections on the far side of the model is formed by means of a 1″ × ½″ Angle Bracket, which is bolted by its longer side to the flange of the supporting bracket and to the underside of the Channel Segment. The near side connection is by means of a ½″ × ½″ Angle Bracket that is secured to the side of the supporting bracket and to the Segment. Care must be taken in making these connections to ensure that the outer flanges of the end Channel Segments are in alignment with the straight sections, so that the pulleys of the bucket may pass over the joints without fear of derailment.

The guard rails 3 are each composed of one 18½″ and one 24½″ Angle Girder and they are supported on brackets similar to the brackets 2. They are parallel to the running rails throughout their lengths and the distance between the running and guard rails is 3 ins. The curved guard rail should project ½″ beyond the curved running rail and therefore the straight guard rails should project one hole beyond their supporting brackets.

The retarder rail 4, fitted for the dual purpose of slowing down the bucket and guiding it round the curve, consists of one 12½″ and one 3″ Strip bolted together. Five holes from its right-hand end it is attached pivotally to a ½″ × ½″ Angle Bracket that is bolted to a 9½″ Girder. This Girder is fixed by its slotted holes to the upright members of the main frame, so that the bottom edge of the retarder at its right-hand pivoted end may be set at ½″ from the top of, and vertically above, the running rail. The left-hand end of the retarder is carried by a ⅜″ Bolt, sliding freely in the slot of a 1″ × ½″ Angle Bracket, which is secured to a Girder bolted across the vertical members of the main frame. The retarder is vertically above the running rail throughout its length and at the left-hand end it is slightly closer to the running rail than at the entering end, although free to lift when required. Consequently as the bucket moves along the running rail, it raises the retarder, thus producing a mild braking effect. The end of the retarder projecting over the curved portion of the running rail must be bent carefully so that the pulleys of the bucket will be guided round the curve.

The curved ramps 5 and 6 consist of 7½″ Flat Girders slightly curved and fixed in the positions shown in the illustration by 1½″ Strips and ½″ × ½″ Angle Brackets. The exact curve will be found on trial when the model is completed.

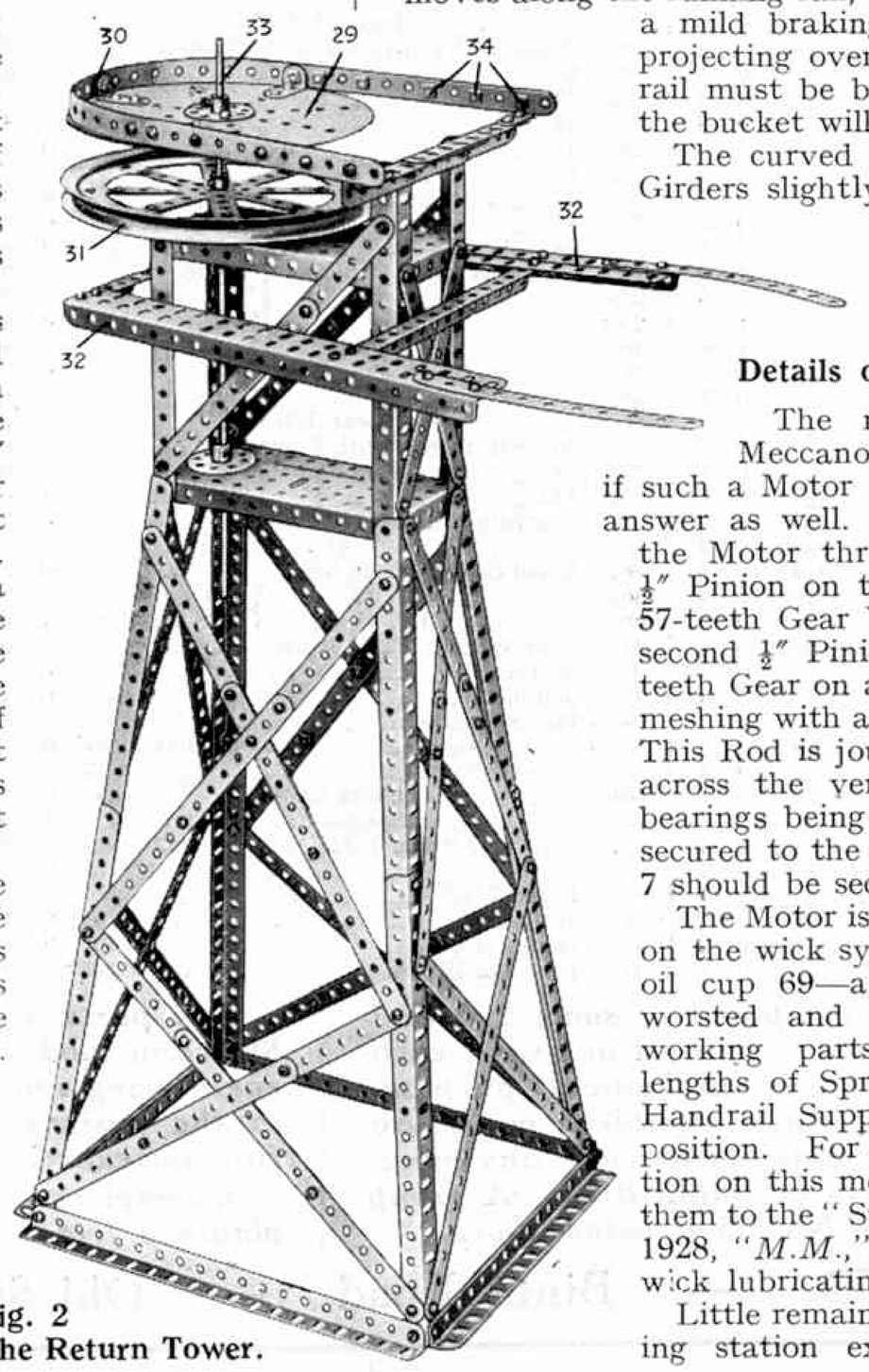


Fig. 2
The Return Tower.

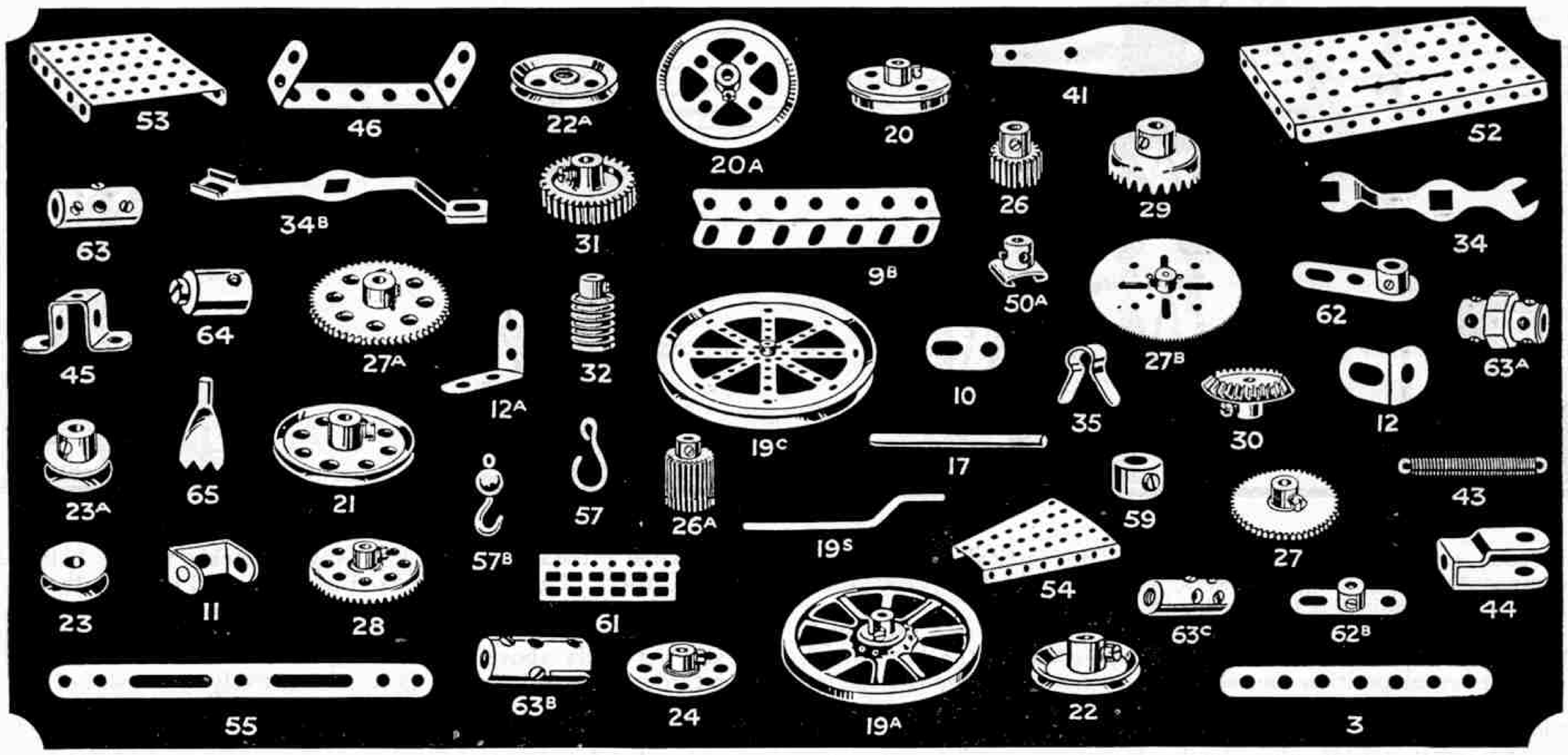
Details of the Driving Unit

The motive power is derived from a Meccano High Voltage Electric Motor, but if such a Motor is not available a 6-volt Motor will answer as well. The vertical shaft 8 is driven by the Motor through the following gear train: A ½″ Pinion on the armature spindle meshes with a 57-teeth Gear Wheel on a Rod that carries also a second ½″ Pinion. The latter engages with a 57-teeth Gear on a Rod on which is mounted a Worm meshing with a 57-teeth Gear on the vertical Rod 8. This Rod is journalled in 7½″ Angle Girders bolted across the vertical members of the frame, the bearings being reinforced by Double Arm Cranks secured to the Girders. Finally, the two 6″ Pulleys 7 should be secured to the Rod.

The Motor is provided with automatic lubrication on the wick system. The oil is drawn up from an oil cup 69—a Chimney Adaptor—by lengths of worsted and conveyed thereby to the various working parts. The worsted is contained in lengths of Spring Cord, which is passed through Handrail Supports and clamped in the required position. For those who require further information on this method of lubrication, we would refer them to the " Suggestions Section " of the December, 1928, "*M.M.*," in which appeared full details of a wick lubricating system.

Little remains to be done to complete the operating station except the addition of the jockey

MECCANO
ACCESSORY PARTS



No.			s.	d.
1.	Perforated Strips, 12½″ long	½ doz.	1	0
1a.	„ „ 9½″ „	„	0	9
1b.	„ „ 7½″ „	„	0	8
2.	„ „ 5½″ „	„	0	6
2a.	„ „ 4½″ „	„	0	5
3.	„ „ 3½″ „	„	0	4
4.	„ „ 3″ „	„	0	3
5.	„ „ 2½″ „	„	0	3
6.	„ „ 2″ „	„	0	3
6a.	„ „ 1½″ „	„	0	3
7.	Angle Girders, 24½″ long	each	0	8
7a.	„ „ 18½″ „	„	0	6
8.	„ „ 12½″ „	½ doz.	1	9
8a.	„ „ 9½″ „	„	1	3
8b.	„ „ 7½″ „	„	1	2
9.	„ „ 5½″ „	„	1	0
9a.	„ „ 4½″ „	„	0	10
9b.	„ „ 3½″ „	„	0	8
9c.	„ „ 3″ „	„	0	8
9d.	„ „ 2½″ „	„	0	7
9e.	„ „ 2″ „	„	0	6
9f.	„ „ 1½″ „	„	0	6
10.	Flat Brackets	„	0	2
11.	Double Brackets	each	0	1
12.	Angle Brackets, ½″×½″	doz.	0	3
12a.	„ „ 1″×1″	½ doz.	0	4
12b.	„ „ 1″×½″	„	0	3
13.	Axle Rods, 11½″ long	each	0	2
13a.	„ „ 8″ „	„	0	2
14.	„ „ 6½″ „	„	0	1
15.	„ „ 5″ „	„	0	1
15a.	„ „ 4½″ „	2 for	0	1
16.	„ „ 3½″ „	„	0	1
16a.	„ „ 2½″ „	„	0	1
16b.	„ „ 3″ „	„	0	1
17.	„ „ 2″ „	3 for	0	1
18a.	„ „ 1½″ „	„	0	1
18b.	„ „ 1″ „	„	0	1
19.	Crank Handles, Large	each	0	2
19s.	„ „ Small	„	0	2
19a.	Wheels, 3″ diam., with set screws	„	0	6

No.			s.	d.
20.	Flanged Wheels, 1¼″ diam.	each	0	5
20b.	„ „ ¾″ „	„	0	4
	Pulley Wheels			
19b.	3″ dia. with centre boss and set screw	„	0	7
19c.	6″ „ „ „ „	„	2	0
20a.	2″ „ „ „ „	„	0	5
21.	1½″ „ „ „ „	„	0	4
22.	1″ „ „ „ „	„	0	3
23a.	½″ „ „ „ „	„	0	3
22a.	1″ „ without „ „	„	0	2
23.	½″ „ „ „ „	„	0	2
24.	Bush Wheels	„	0	4
25.	Pinion Wheels, ¾″ diam., ½″ wide	„	0	6
25a.	„ „ ¾″ „ ½″ „	„	0	8
25b.	„ „ ¾″ „ ¾″ „	„	0	10
26.	„ „ ½″ „ ¼″ „	„	0	4
26a.	„ „ ½″ „ ½″ „	„	0	6
26b.	„ „ ½″ „ ¾″ „	„	0	8
	Gear Wheels			
27.	50 teeth to gear with ¾″ pinion	„	0	6
27a.	57 „ „ „ ½″ „	„	0	6
27b.	133 „ „ „ ½″ „ (3½″ diam.)	„	1	3
28.	Contrate Wheels, 1½″ diam.	„	0	9
29.	„ „ ¾″ „	„	0	6
30.	Bevel Gears, ⅞″, 26 teeth	„	0	9
30a.	„ „ ½″, 16 „ *can only be*	„	0	6
30c.	„ „ 1½″, 48 „ *used together*	„	1	6
31.	Gear Wheels, 1″, 38 teeth	„	1	0
32.	Worms	„	0	5
34.	Spanners	„	0	2
34b.	Box Spanners	„	0	4
35.	Spring Clips	per box (doz.)	0	3
36.	Screw Drivers	each	0	3
36a.	„ „ Extra Long	„	0	6
36b.	„ „ Special	„	1	0
37.	Nuts and Bolts, 7/32″	per box (doz.)	0	6
37a.	„	„ „	0	3
37b.	Bolts, 7/32″	„ „	0	3
38.	Washers	„	0	1
40.	Hanks of Cord	2 for	0	3
41.	Propeller Blades	...per pair	0	4

No.			s.	d.
43.	Springs	each	0	2
44.	Cranked Bent Strips	„	0	1
45.	Double „ „	„	0	1
46.	Double Angle Strips, 2½″×1″	½ doz.	0	6
47.	„ „ „ 2½″×1½″	„	0	9
47a.	„ „ „ 3″ ×1½″	„	0	10
48.	„ „ „ 1½″×½″	„	0	4
48a.	„ „ „ 2½″×½″	„	0	5
48b.	„ „ „ 3½″×½″	„	0	6
48c.	„ „ „ 4½″×½″	„	0	9
48d.	„ „ „ 5½″×½″	„	0	9
50a.	Eye Pieces, with boss	each	0	4
52.	Perforated Flanged Plates, 5½″×2½″	„	0	5
52a.	Flat Plates, 5½″×3½″	„	0	5
53.	Perforated Flanged Plates, 3½″×2½″	„	0	3
53a.	Flat Plates, 4½″×2½″	„	0	3
54.	Perforated Flanged Sector Plates	„	0	3
55.	„ Strips, slotted, 5½″ long	„	0	2
55a.	„ „ „ 2″ „	„	0	1
56.	Instruction Manuals, No. 4-7	„	1	6
56a.	„ „ No. 00-3	„	1	6
56b.	„ „ No. 0	„	0	6
56c.	Meccano Standard Mechanisms Manual	„	1	0
56d.	„ Book of New Models	„	0	6
56f.	„ Bound Manual	„	7	6
57.	Hooks	2 for	0	1
57a.	„ Scientific	each	0	1
57b.	„ Loaded	„	0	3
58.	Spring Cord	per length	0	9
58a.	Coupling Screws for Spring Cord	doz.	0	6
59.	Collars with Set Screws	2 for	0	3
61.	Windmill Sails	4 for	0	6
62.	Cranks	each	0	3
62a.	Threaded Cranks	„	0	4
62b.	Double Arm Cranks	„	0	3
63.	Couplings	„	0	6
63a.	Octagonal Couplings	„	0	8
63b	Strip Couplings	„	0	8
63c.	Threaded Couplings	„	0	6
64.	„ Bosses	„	0	2
65.	Centre Forks	„	0	1

The Meccano system is composed of some 250 real engineering parts, mostly made of steel or brass, each one of which has a definite mechanical purpose. These parts combine to form a complete miniature engineering system that enables practically any movement known in mechanics to be duplicated. A group of the parts from No. 1 to No. 65 is listed above.

New parts are always being invented in order to keep Meccano model-building in line with the most modern engineering requirements. The greatest care is taken in the designing of these parts to ensure that they function exactly as their counterparts in actual practice.

A complete list of all the parts in the system may be obtained from any Meccano dealer on application.

MECCANO LTD. — Binns Road — Old Swan — LIVERPOOL

pulley 9 and its weight, the guide pulleys 10 and 11, the strainers 12 and other details that are clearly apparent.

The guide pulley 10 is a ½″ loose Pulley, mounted on a Pivot Bolt, which is attached to a ½″ × ½″ Angle Bracket bolted to the guard rail 3. The other guide pulley 11 consists of a 1″ loose Pulley running freely between two Bush Wheels. The Rod carrying this arrangement is mounted in the boss of a Crank the end hole of which is secured to the guard rail.

The strainers 12 are of particularly neat construction and are eminently suitable for models other than the one under consideration. Each of these appliances consists essentially of two Cranks, through the bosses of which is passed a 1″ Rod carrying a ½″ loose Pulley. The ends of the Cranks are secured by bolts to each end of a Coupling. A 4½″ Screwed Rod is passed through the centre hole of the Coupling and a Collar is secured to its top end to prevent it pulling out of the Coupling. The other end of the Rod works in the tapped bore of a Coupling that is secured to an 8″ Rod placed across the main frame. The other strainer is of course exactly similar.

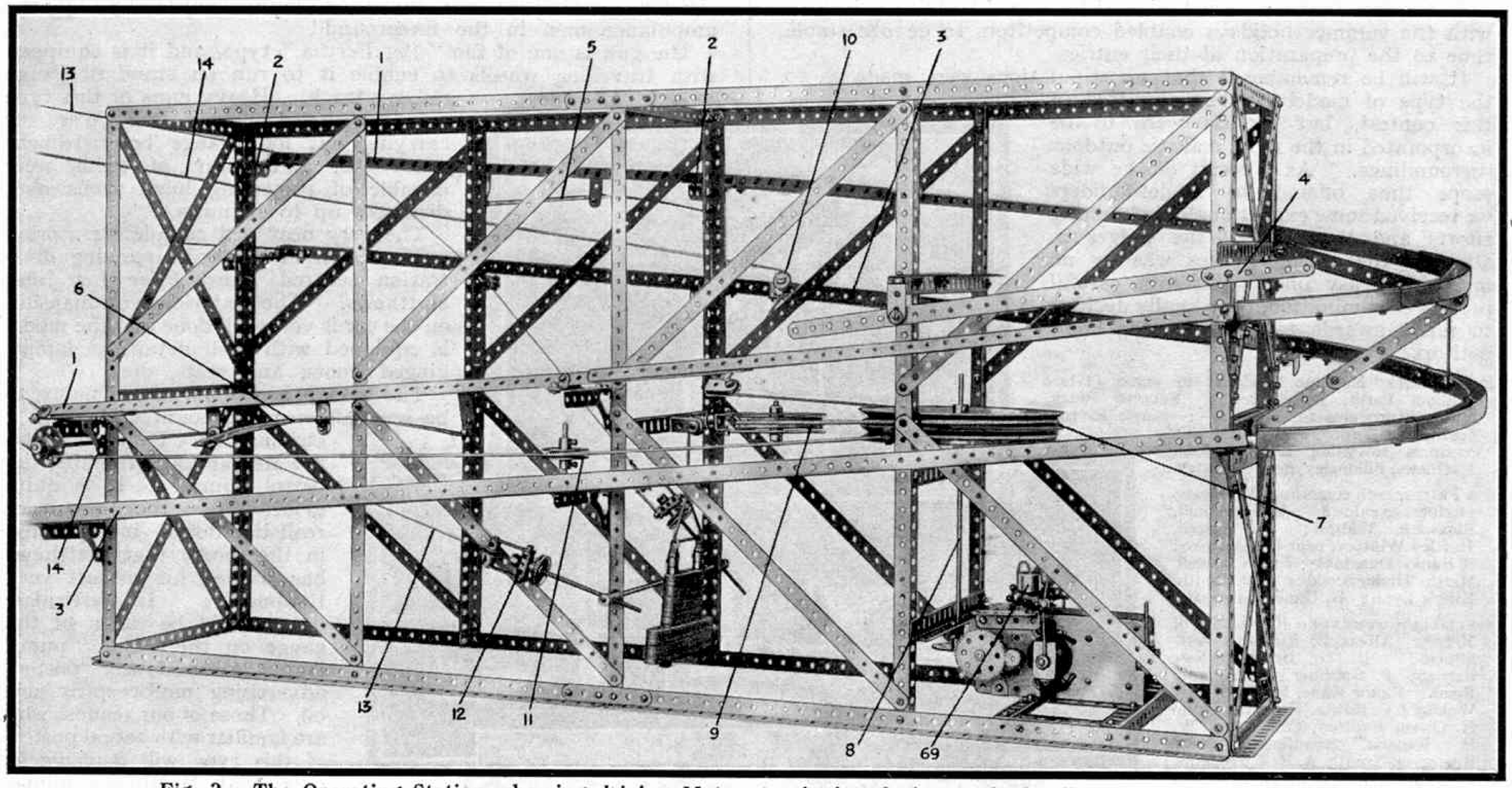


Fig. 3. The Operating Station, showing driving Motor, tensioning device on the hauling rope, and Strainers, etc.

Assembling the Return Tower

Having completed the operating station, attention should next be devoted to the construction of the return tower. This, as will be seen from Fig. 2, consists of a strongly built tower on the top of which is a 6″ Pulley 31 for the hauling rope to pass round, and a semi-circular rail 30 on which the bucket runs.

The curved portion of the rail 30 is a 12½″ Strip and it is bent carefully to the radius of a Circular Plate 29, to which it is secured by means of 1″ × ½″ Angle Brackets; two Washers are placed on each bolt between the Strip and Angle Bracket. The straight portions of the rail are formed by 5½″ Strips placed one on each side of the 12½″ Strip, their free ends being attached to 1″ × ½″ Angle Brackets. The latter are secured to a built-up girder 7 ins. in length, which is bolted across the top of the tower. The ends of the carrier rope will eventually be clamped between the 5½″ Strips by means of the bolts 34.

The Circular Plate 29 is supported by an 11½″ Rod 33, which passes through both Flanged Plates and is secured rigidly in position by Bush Wheels bolted to the Plates. Included in the assembly is also the 6″ Pulley Wheel 31, which is placed boss downward and is free to turn on the Rod, three Washers being placed under its boss.

Each of the guard rails 32 consists of one 9½″ Flat Girder and one 9½″ Angle Girder. They are secured to a 7½″ Angle Girder that is bolted across the tower in the position shown, and at the other end they are attached to Flanged Brackets, which are attached rigidly to the vertical 5½″ Girders. The entering edge of the near guard rail is provided with a 5½″ Curved Strip and that of the far guard rail with a 2½″ large radius Curved Strip. The object of the Curved Strips (which are common to the guard rails of the other units of the model) is to lead the guide pulley of the bucket on to the rails without shock or possibility of derailment.

The Supporting Towers

We may now pay attention to the supporting towers. Fig. 1 represents the tower that is seen in the general view next to the return tower. Nothing need be said as regards its general construction for that will be apparent by glancing at the illustration, so it is only necessary to draw attention to the more important details.

The carrier rope in the prototype is supported from the towers on what are known as "saddles." In the model the saddles are attached to the ends of the 12½″ Girders forming the top of the tower, and each one consists of two 4½″ Strips that are placed together face to face and separated by a Washer on each of the three bolts. The carrier rope will be passed under the centre bolt (which also serves to secure the saddle to its support), and over the two end ones. Thus the rope is free to move in its saddle.

The other tower shown in the illustration between the operating station and the automatic loading plant is exactly the same, in essentials, as that just described, with the exception that the saddle on the far side of the model is composed of a pair of 5½″ Curved Strips, and the entering portion of the guard rail consists of a 4½″ Strip and a 2½″ Curved Strip bent parallel with the slope of the carrier rope.

(To be concluded)

Parts Required to build the Meccano Aerial Ropeway:

43	of No.	1	13	of No.	8	52	of No.	12	1	of No.	19b	1031	of No.	37	28	of No.	59	12	of No.	89	7	of No.	103k	1	of No.	125
22	„ „	1a	32	„ „	8a	10	„ „	12b	3	„ „	19c	6	„ „	37b	14	„ „	62	3	„ „	89a	10	„ „	108	2	„ „	126a
32	„ „	1b	26	„ „	8b	2	„ „	13	2	„ „	20	36	„ „	38	7	„ „	62b	1	„ „	90	3	„ „	111	1	„ „	127
32	„ „	2	17	„ „	9	2	„ „	13a	6	„ „	22	2	„ „	46	9	„ „	63	1	„ „	90a	2	„ „	111a	20	„ „	131
60	„ „	2a	10	„ „	9a	1	„ „	14	2	„ „	22a	2	„ „	48a	1	„ „	63c	6	„ „	94	12	„ „	111c	6	„ „	136
28	„ „	3	2	„ „	9b	1	„ „	15a	7	„ „	23	2	„ „	52	1	„ „	66	4	„ „	96	2	„ „	114	7	„ „	139
5	„ „	4	5	„ „	9c	8	„ „	16	10	„ „	23a	6	„ „	52a	3	„ „	67	2	„ „	102	1	„ „	115	7	„ „	139a
51	„ „	5	8	„ „	9d	7	„ „	16a	5	„ „	24	2	„ „	53	6	„ „	70	1	„ „	103	1	„ „	116	11	„ „	147b
8	„ „	6	3	„ „	9e	2	„ „	16b	1	„ „	26	4	„ „	53a	8	„ „	72	5	„ „	103a	1	„ „	116a	1	„ „	154a
3	„ „	6a	10	„ „	9f	3	„ „	17	4	„ „	27a	4	„ „	54	5	„ „	76	2	„ „	103c	8	„ „	119	1	„ „	160
12	„ „	7	24	„ „	10	1	„ „	18a	2	„ „	30	1	„ „	57	1	„ „	80a	4	„ „	103d	1	„ „	120	2	„ „	164
22	„ „	7a	1	„ „	11	3	„ „	18b	2	„ „	32	12″	„ „	58	2	„ „	80b	4	„ „	103f						

2 Electric Motors. 30 ft. (approx.) of brass stranded picture wire. 40 ft. (approx.) of fairly thick string.

Results of
Meccano Model-Building Contests

By Frank Hornby

Special Summer Contest (Home Section)

THE special "Summer" Model-building Contest announced in the "*M.M.*" for August last proved very popular, and the fact that the period allowed for model-building coincided with the summer holidays enabled competitors to devote ample time to the preparation of their entries.

It will be remembered that no stipulations were made as to the type of models to be submitted in this contest, but models were to be incorporated in the most realistic outdoor surroundings. As a result of the wide scope thus offered to model-builders we received some exceptionally interesting efforts and the task of the judges in allotting the various prizes was by no means an easy one. After a careful process of elimination, they finally decided to make awards to the following competitors :

FIRST PRIZE, Meccano products to value £1-1s.: William Parks, Peacehaven. SECOND PRIZE, Meccano products to value 15/-: Barrie Rivron, Ipswich; THIRD PRIZE, Meccano products to value 10/6: John Matthews, Fillongley, near Coventry.

SIX PRIZES, each consisting of Meccano products to value 5/-: W. Raybould, Bloxwich, Walsall; J. Hazell, Hartley Wintrey, near Basingstoke; P. Banks, Dunstable; Eric N. Revell, Marsh, Huddersfield; J. P. Smith, King's Lynn; B. Unné, Harrogate.

SPECIALLY COMMENDED (Certificate of Merit): Albert E. Ridings, Westlothian; B. G. Brockis, New Barnet; P. Gardiner, Hornchurch, Essex; Victor Kaile, Mayford, near Woking; C. Rowse, Redruth; John H. Owen, Radford, Coventry; W. H. Kennon, Swadlincote, near Burton-on-Trent; A. E. T. Huggins, Gloucester; John Beaulah, Beverley, E. Yorks.; Douglas Maitland, Newcastle-on-Tyne; Norman L. Eades, Southampton; Derek Anderson, Great Missenden.

The First Prize goes to William Parks for an excellent model of a Steam Shovel which he photographed actually at work excavating real soil. (The photograph is reproduced on this page). Apart altogether from the realism of the scene, Park's entry is noteworthy for the fine workmanship displayed in the construction of the model. Nothing in the way of detail has been overlooked, and Meccano boys will note particularly its extremely neat appearance and the almost entire absence of gears, etc., on the outside of the cab.

The Steam Shovel is mounted on "pedrails" or caterpillars, which enable it to travel over the roughest ground without difficulty. The "caterpillars" are attached to the travelling base, to the centre of which is pivoted the superstructure carrying the boom and operating mechanism. Miniature "labourers" are shown at work around the machine, as would be the case in actual practice, and the side-tipping wagons add a further suggestion of reality to this very fine effort.

Barrie Rivron obtained Second Prize with an original model of a heavy artillery gun set amongst suitable outdoor scenic effects. Considering that Rivron is not yet 8 years of age, his entry is all the more worthy of the prize awarded to it. To design and construct such a model absolutely unaided is certainly a remarkable achievement for this young enthusiast. A glance at the illustration of the model on the opposite page will reveal a wealth of extraneous detail. Unfortunately the constructional details of the model itself are not shown very clearly, but its sinister possibilities are suggested impressionistically by the ambulance men in the foreground!

The gun is one of the "Big Bertha" type, and it is equipped with travelling wheels to enable it to run on standard gauge railway track. Heavy guns of this type were employed during the War for carrying out long range bombardment operations, and many of them were capable of projecting huge shells over distances up to 40 miles!

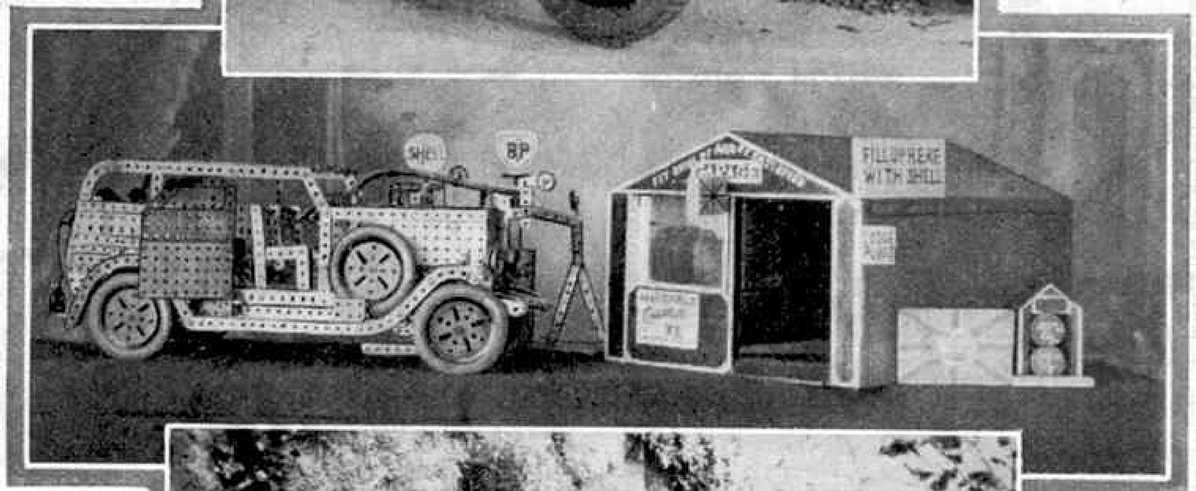
The very neat and complete motoring scene shown in the accompanying illustration secured Third Prize for John Matthews. The exterior workmanship on the car is very well done and the model is equipped with such details as lamps, hinged doors, and seats, etc.

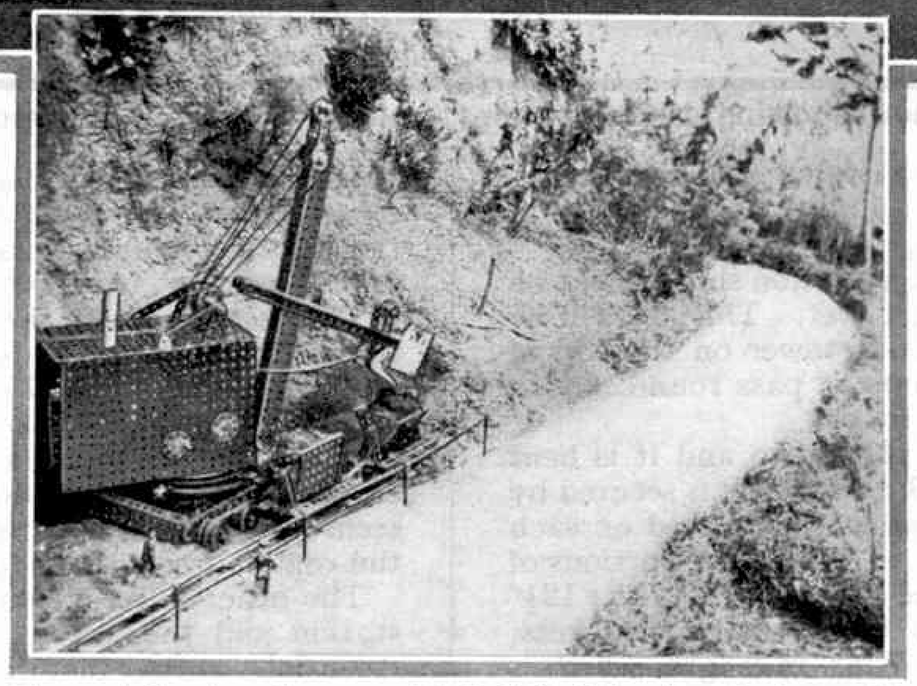
The garage is reminiscent of many to be seen all over the countryside, and a striking effect is produced by the Meccanitian attending the petrol pumps. It is quite evident from the amount of realistic detail incorporated in the model that Matthews has studied his subject very thoroughly. In particular, note should be taken of the gauge on the "B.P." pump and the miniature posters advertising motor spirit and oil. Those of our readers who are familiar with actual posters of this type will perceive at once that Matthew's miniatures are very realistic reproductions. The finishing touch to this well-thought out scheme is provided by the Meccano Dunlop Tyres exhibited in the garage window!

I think all readers will agree as to the realism of J. P. Smith's model dirt track machine and rider. What a splendid suggestion of speed he has obtained. One can almost hear the roar of the engine as the intrepid motorist rounds the corner and flashes past amidst a cloud of dust! Smith says that his model represents a competitor in the famous "T.T." races, and I think he has succeeded in expressing his very original idea. The scenic effects are excellent and had the model been of a little more original type, Smith would have stood a good chance of securing the biggest prize.

Eric Revell's prize-winning model is in the form of a very clever representation of pit-head cage-winding gear, of the type usually to be seen at coal mines. The model was erected in the garden and shafts were sunk in the actual soil, so that the cages operate under very realistic conditions. The cage winding mechanism is driven from a Meccano Clockwork Motor mounted in the "power house" and connected with the mechanism through a 2 : 1 ratio reduction gear. Railway lines and tipping trucks are provided and the track is so laid out that coal may quickly be discharged from the cage into the waiting wagons.

Unfortunately, owing to lack of space, I am unable to describe many other extremely interesting entries.



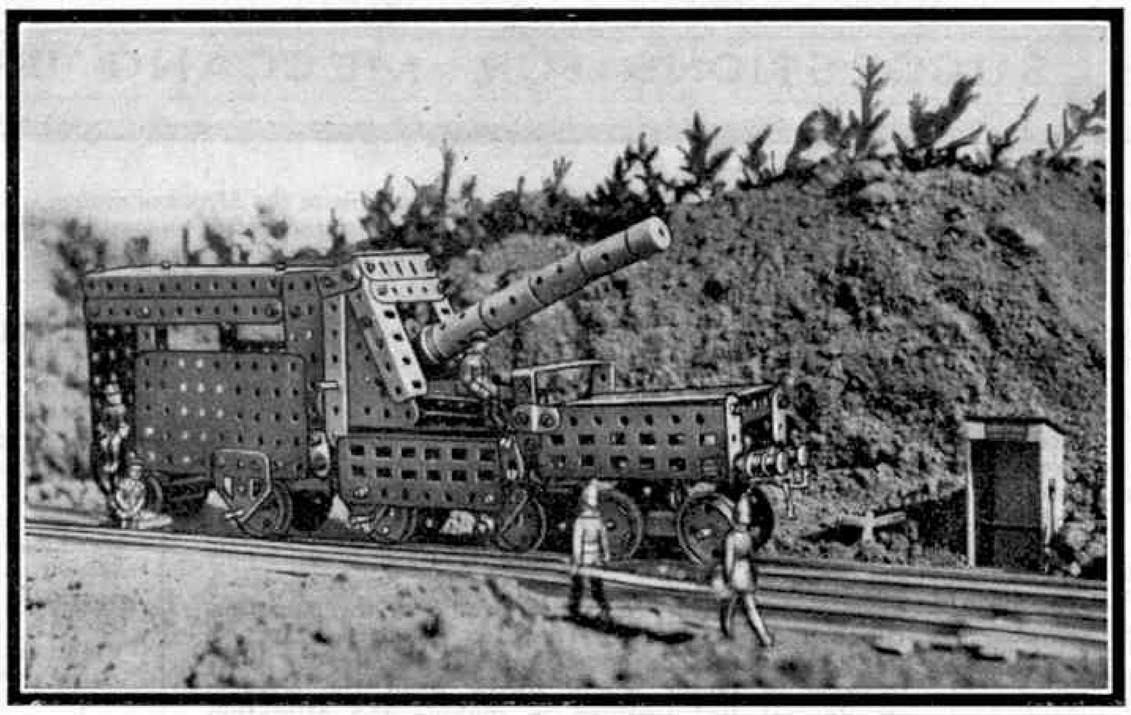


Top : Action is well expressed in J. P. Smith's prize-winning model. Centre : The true-to-life scene entered by John Matthews. Bottom : William Parks' fine model Steam Shovel arranged in an appropriate setting.

"GOVERNOR" COMPETITION (Home and Overseas)

In this contest we set readers the task of devising a spring-controlled centrifugal governor, of a type similar to that employed for regulating the speed of gramophone motors and suitable for controlling the Meccano Clockwork Motor, etc. It was thought that the construction of a simple yet practical governor of this type from standard Meccano parts would provide a searching test of the competitors' skill in solving mechanical problems.

Entries were received from readers in all parts of the world—sufficient proof that no task is too difficult for a Meccano boy to attempt—and the work of judging was exceedingly difficult, for many efforts appeared to be almost of equal merit. One or two competitors, however, had made their models a little more complicated than the Meccano governor which we had set up as a standard design, and others, whilst submitting perfectly efficient governors, had omitted to indicate clearly the exact mechanism employed to increase or decrease the frictional resistance applied to the rotating mechanism. By eliminating such entries and taking into consideration the ages of the competitors and the manner in which the models were described, it was finally decided to award the prizes as follows:



Barrie Rivron's novel entry in the "Summer" Contest, featuring a heavy gun.

Home Section. First Prize, Meccano products to value 10/6: J. P. T. Bennett, Bristol.

Six Prizes, each consisting of a copy of "Famous Trains" by C. J. Allen; Robert C. Storrar, Letham Ladybank; B. Ashman, London, S.W.12; R. Fricker, Shepherds Bush, W.12; George Effemey, Christchurch, Hants.; H. Wittey, London; L. Harling, Burnley, Lancs.

Overseas Section. First Prize, Meccano products to value 10/6: Frank S. Marquand, Woodville, North Island, New Zealand.

Six Prizes, each consisting of a copy of "Famous Trains" by C. J. Allen: V. K. Krause, Johannesburg, Transvaal, S. Africa; Leslie Storey, Sydney, N.S.W., Australia; John A. Rodriguez, Montreal, Canada; A. H. Godfrey, Nairobi, Kenya Colony; Brian Warner, Grahamstown, S. Africa; D. J. Mehta, Bombay, India.

Many competitors adopted somewhat similar methods of construction and their models varied only on minor points, such as the manner of securing the springs to the axle, and the particular parts used as weights. Since it is impossible to illustrate each entry we have selected the best constructional features from the most outstanding ones and have combined these in a special model. This model is illustrated and described in the "Suggestions Section" in this issue and it may be taken as an example of the entries generally.

The model with which J. P. T. Bennett secured his prize in the Home Section was practically identical with the model illustrated; it differed only in the manner adopted for controlling the speed. In Bennett's model the controlling device comprises a Strip of suitable length pivotally supported at its central hole. When in use, the face of the upper end of the Strip bears against the inner face of the slidable Bush Wheel (1 in the illustration on page 40) and its lower end against the end of a Threaded Rod which passes through a fixed Threaded Crank. Rotation of the Threaded Rod causes it to move in the Threaded Crank, thus operating the Strip, the upper end of which, bearing against the slidable Bush Wheel, either prevents or allows the latter to move up the governor spindle according to the direction in which the Threaded Rod is turned. As the governor revolves, centrifugal force tends to move the weights outward away from the axle, thus extending the springs and pulling the Bush Wheel along the axle until it is prevented from further movement by the regulating Strip.

By altering the position of the Strip, through a turning movement applied to the Threaded Rod, it will readily be seen that the speed at which the governor shaft may rotate is capable of variation within fine limits.

The entries in the Overseas Section are particularly interesting, as they allow comparison of the rival merits of Meccano boys at home and abroad at the great game of model-building. Examination proved that there is really little to choose between the models submitted in either Sections. F. S. Marquand's model, which obtained the biggest prize in the Overseas Section, was almost a replica of Bennett's entry, excepting that Marquand elected to use a 2" slidable Pulley Wheel in place of Bennett's Bush Wheel.

Many of the entries submitted, both in the Home and Overseas Sections, closely resembled the governor described in S.M. 107. This particular example is not a spring type, however, and such entries were automatically disqualified.

"LYNX-EYE" CONTESTS (Final Awards)

This month I am able to announce the prize-winners in the Overseas Section of the Fourth (and final) Contest of the Lynx-eye series, together with the list of Special Awards (Home and Overseas) to those competitors who succeeded in solving the greatest number of pictures in the complete series.

Although the Fourth Contest proved a greater stumbling block to keen-eyed Meccanoites than any of the previous contests, many competitors solved correctly all the puzzle pictures. The prizes were accordingly allotted in rotation to the senders of the first all-correct solutions examined, and the various prizes were secured by the competitors named in the following list:

First Prize, Meccano products to value £1-1s.: E. Worthington, Vancouver, B.C.; Second Prize, Meccano products to value 15/-: MacLeod Morgan, Cremorne, Sydney; Third Prize, Meccano products to value 10/6: J. C. Rishworth, Kolar Gold Fields, India.

Twelve Prizes, each consisting of a copy of "Famous Trains" by C. J. Allen; A. Abdulrahim, Karachi, India; Jack W. Tanner, Annandale, Sydney, Australia; Harry Wicke, Sydney, Australia; Miss C. Gonsalves, Bombay, India; J. G. Guanadurai, Trichinopoly, India; John A. Rodriguez, Montreal, Canada; J. A. Gomes, Bombay, India; D. D. Grieve, Bloemfontein, S. Africa; Walter Pols, Antwerp, Belgium; C. J. McCain, Leichhardt, Sydney, Australia; B. D. Joshi, Almora, India; Emil Zangger, Zurich, Switzerland.

For the benefit of readers residing overseas who are unable at the moment to refer to the solution to the fourth set of pictures, which appeared in the November "*M.M.*" in connection with the "Home" Section results, I repeat it this month. The following are the Manual numbers of the models from which the fragmentary puzzle pictures were taken. The model numbers are those that appear in the 1928/9 Manuals.

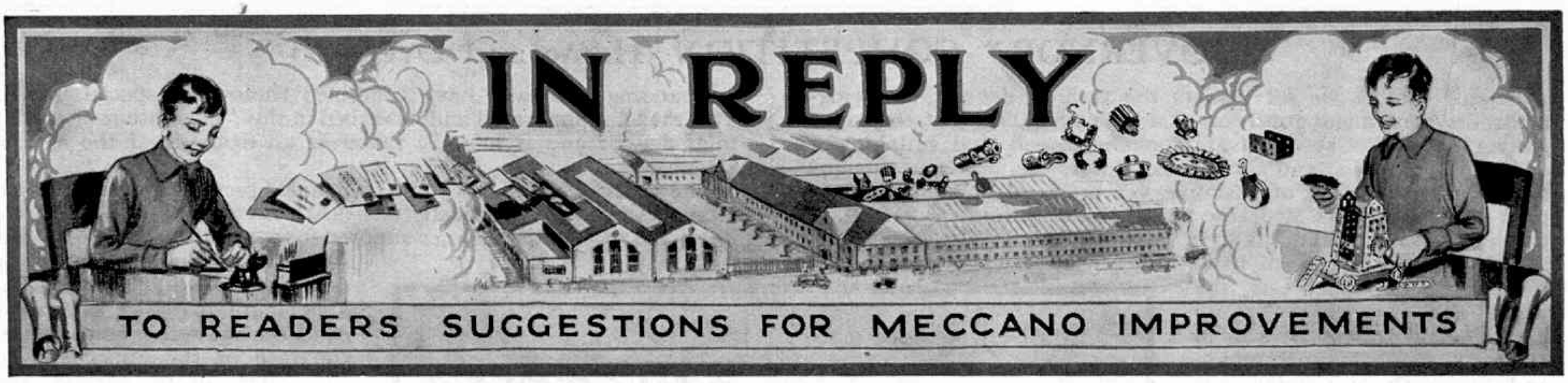
Fig. 1, Model No. 00.96; Fig. 2, Model No. 4.7; Fig. 3, Model No. 3.51 (Fig. 3.51a); Fig. 4, Model No. 1.52; Fig. 5, Model No. 6.8; Fig. 6, Model No. 1.44; Fig. 7, Model No. 6.11; Fig. 8, Model No. 1.7; Fig. 9, Model No. 7.12; Fig. 10, Model No. 6.28 (Fig. 6.28a); Fig. 11, Model No. 0.22; Fig. 12, Model No. 4.20.

In addition to the various awards in each individual Contest of the series, it was intended originally to make three Special Awards consisting of Meccano products to the value of three, two, and one guineas respectively to three competitors in the Home Sections who solved the greatest number of pictures, and another three similar awards to Overseas boys, but owing to the fact that several competitors succeeded in solving all the forty-eight pictures, it was decided to divide the prizes equally between them, and awards were made as follows:

Home Sections: Seven Special Prizes, each consisting of Meccano products to value 18/-: Ernest H. Bradshaw, Sheffield; Francis O'Connel, Walton, Liverpool; Harry P. Thornton, London, N.W.10; Geo. S. Marsh, Blackpool; George Charlton, Eltham; G. Effemey, Christchurch, Hants.; P. D. Banks, Dunstable.

Overseas Section: Eight Special Prizes, each consisting of Meccano Products to value 15/9: J. G. Guanadurai, Trichinopoly, India; J. A. Gomes, Bandra, Bombay, India; D. Grieve, Bloemfontein, S. Africa; Miss C. Gonsalves, Bombay, India; Harry Wicke, Manly, Australia; Jack W. Tanner, Annandale, Sydney, Australia; C. J. McCain, Leichhardt, Sydney, Australia; J. C. Rishworth, Kolar Gold Fields, India.

Judging by the large number of entries received, it is fairly evident that Meccano boys appreciate this type of contest, and I hope to announce details of further somewhat similar competitions in the near future. The many all-correct entries received are an eloquent testimonial to the average Meccano Boy's intimate knowledge of his chosen hobby. To those competitors who submitted correct solutions but unfortunately failed to secure a prize I can only say, try again! And may they have better luck next time!



In this page, month by month, we reply to suggestions regarding improvements or additions to the Meccano system. We receive many hundreds of these suggestions every week, and consequently we are able to publish only ideas that show particular interest or ingenuity. Suggestions submitted for consideration in this section must be written on a separate sheet of paper and the name and address of the sender must appear on each sheet used. Envelopes should be addressed to "Suggestions," Meccano Ltd., Binns Road, Old Swan, Liverpool.

WIRE WHEELS.—Although wire spoked wheels would impart a very handsome appearance to a model in which they were incorporated, their cost of manufacture prohibits their introduction to the system. Some idea of the expensive procedure that the manufacture of model wire wheels would involve can be gained by comparing the price of an actual cast spoked motor car wheel with one fitted with wire spokes—the difference amounting to many pounds! We can only suggest that you fit "discs," made from sheet tin or cardboard, to the wheels of your model car, and imagine that the latter are for the protection of the "wire wheels" hidden inside! (*Reply to F. Grainger, Hull, and F. R. Kingston, Didsbury, Manchester*).

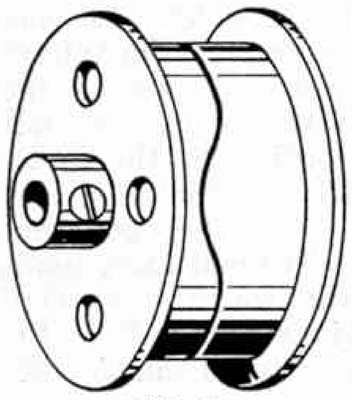


Fig. 1

SPECIAL CLIP.—An accessory resembling a Flat Bracket to which is secured a clip similar to that fitted to the Dredger Bucket would, when used in conjunction with Sprocket Chain, enable neat and quite efficient caterpillar track to be built. The whole question of caterpillar track as applied to Meccano has been receiving the attention of our production staff for some time past and their verdict as to its practicability will shortly be available. In the meantime we are making a note of your idea. (*Reply to R. Hastings, Buenos Aires, Argentine*).

IMPROVED SCREWDRIVER.—We note that you consider the Special Screwdriver fitted with extra-long blade rather clumsy, but we do not think it advisable to carry out your suggested alteration. Your idea would be to manufacture the blade of the driver approximately half its present length, and employ couplings and rods to lengthen it when required. This method, however, would be unsatisfactory and in addition would necessitate special rods having "flats" or "key-ways" cut in them. Actually we have found the extra long blade a distinct asset in model-building, the fact that it can be passed through holes in Plates and Strips making it a very adaptable tool. For certain types of model-building however, the short bladed screwdriver (part No. 36), is more convenient. A short blade for the Special Screwdriver could be devised by cutting the existing blade in half and filing "flats" on the severed portions, connecting these together when required by a standard Coupling. (*Reply to K. Rinderle, Sandusky, Ohio, U.S.A.*).

BUILT-UP ECCENTRIC.—We were interested in your idea regarding an eccentric "sheave" and "strap," and for the benefit of other readers we are illustrating your suggestion. As will be seen in the first sketch (Fig. 4) the eccentric strap would be formed from two semi-circular members BB, held together by bolts CC passed through threaded holes in lugs attached to BB. A standard Meccano Strip A would be slipped on to one of the bolts C to form a connection between the eccentric and the mechanism that it is required to actuate. The centre portion or "sheave" of the eccentric, which is shown in Fig. 5, would resemble a Flanged Wheel with the exception that the boss would be placed out of centre. The whole unit when assembled would be quite efficient, but would be more clumsy than the existing Meccano Eccentrics. Perhaps readers interested will offer their opinions on the matter and suggest further uses for this article? (*Reply to J. R. Hopkins, Wallasey*).

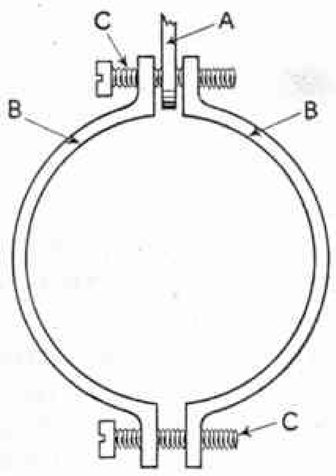


Fig. 4

IMPROVEMENT TO BOLTS.—We were interested in your suggestion that the shanks of the bolts should be rounded so as to facilitate fitting nuts to them. This process, would however, affect the overall length of the bolts and might possibly reduce their adaptability. We do not consider the alteration advisable. (*Reply to S. Kosak, Prague, Czecho-Slovakia*).

IMPROVED MOTOR.—We agree that if an 8-pole armature were fitted to the Meccano 6-volt Motor a more even 'torque' would be produced and smoother running might result. The cost of this alteration would, however, be considerable, and as very little increase in power would follow from the change, we do not feel justified in making the alteration at present. We shall keep your idea in mind, however. (*Reply to A. Thurber, Calgary, Canada*).

1½" CURVED STRIP.—A curved strip of this size is hardly necessary in the system as the 2½" Curved Strip has proved to be the smallest practical size for this type of accessory. Practically the only use that your suggested part would have would be of an ornamental nature We do not consider therefore its introduction is advisable. (*Reply to G. M. Taylor, Frank Jones, and A. W. Shaw, Mossley*).

LARGER CIRCULAR SAW.—There would be no point in our introducing a larger circular saw as the existing Saw (Part No. 159) is of a convenient size for the majority of models. In addition a saw of large diameter would require considerable power to drive it if it were to cut even the thinnest wood. (*Reply to A. Thurbet, Calgary, Alberta, Canada*).

DRUM CAM.—Your suggested method of constructing a drum cam suitable for use in the Meccano system offers distinct possibilities. Your idea has apparently been evolved from the disc cam suggested by H. Carter (Surbiton), which was illustrated and described on this page last October. Your method of constructing a cam of this type is remarkably ingenious, however, and as its construction would not be clear to readers from a description alone we are including several sketches on this page showing the idea. The cam would be built up from two special flanged wheels, having flanges shaped as shown in Fig. 1, where the two wheels have been butted together to form a belt pulley. In Fig. 2, the wheels have been slightly separated leaving an undulating groove in which a Rod or Strip might be placed, thus forming quite an efficient drum cam. In Fig. 3 one of the wheels has been mounted on a vertical shaft to form a "face" cam, a ½" loose Pulley being mounted on a Strip so that it rests on the flange of the wheel. The ingenuity of the idea will at once be apparent but whether it would prove a really useful accessory is doubtful. We intend giving this idea more attention in the near future. (*Reply to K. F. G. Gardener, Northampton*).

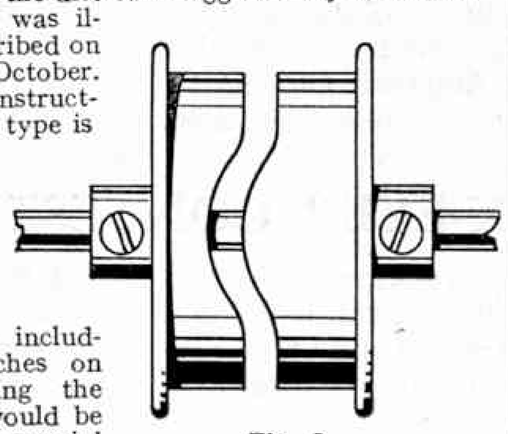


Fig. 2

COMPLETE CONNECTING ROD.—A specially manufactured connecting rod complete with "big end" and "little end" would be a totally unsuitable addition for the system. The equivalent of your suggested article can quite easily be reproduced from standard parts. (*Reply to D. Young, East Croydon*)

HAND LEVER.—Although the design of your suggested hand lever is quite sound, we do not consider that there is any real need for this article, as it can be reproduced quite effectively with standard parts. The upper portion of your suggested article could, for instance, be formed from a Meccano Rod having a standard Coupling fitted to it at its lower end. The flat pivoted portion at the base of the suggested lever could be improvised from a Meccano flat Strip of suitable length held to the Coupling by bolts secured in its threaded holes. (*Reply to F. Fenn, Seven Kings*).

CINEMATOGRAPH SHUTTER.—We were interested in your idea regarding a cinematograph shutter. We do not consider however. that it would be advisable to introduce a special accessory for this purpose, as its functions would be too limited, but we suggest instead that you cut out a segment of stiff cardboard to the correct size and secure this by means of bolts to a Bush Wheel mounted on the shutter-operating rod. A shutter built in this manner will function quite satisfactorily. (*Reply to R. Marshall, Birdwell*).

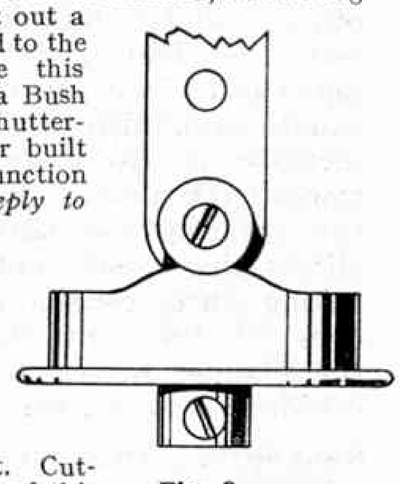


Fig. 3

IMPROVED CIRCULAR STRIP.—We agree that if teeth were cut in the outer circumference of the Circular Strip (part No. 145), the equivalent of a 7" gear wheel would result. Cutting teeth in a large part of this type would of course be a costly procedure, but we are keeping your idea in mind. (*Reply to W. S. Lane, Cheltenham Spa*).

WORM AND WORM WHEEL.—In designing the Meccano Worm it was necessary to produce an article that could be meshed with the whole range of Meccano gears and consequently the teeth are shaped so that they will gear with straight faced spur teeth. We agree, that to obtain the maximum efficiency from a gearing of this type, a special worm wheel should be used having teeth cut "on the skew" to fit closely to the worm, but the introduction of this wheel would not be advisable on account of its limited application. Even if a special wheel were produced it would be impossible to employ it in a reversible drive mechanism, the pitch of the threads of the existing Worm being too fine to allow this. (*Reply to F. R. Harrison, Carlisle, and R. McLaughin, Leighton Buzzard*).

GRINDSTONE.—We note your idea regarding the introduction of a small grindstone. This is quite a good idea and we intend givng it careful consideration. Incidentally, quite a useful device that can be used for finishing small wooden articles, such as pieces of fretwork, can be made by securing sand-paper to the periphery and face of a disc of wood, the latter being mounted rigidly on a standard Axle and rotated by a Meccano Electric Motor. (*Reply to C. Avons, Trowbridge*).

REVISED ECCENTRIC.—Your proposed alteration to the Meccano Triple Throw Eccentric is quite ingenious. Your idea would be to substitute a movable boss for the three bosses now fitted, the special boss being fitted in a slot cut in the "sheave" of the eccentric, and held in place by a clamping nut. The arrangement would provide a large number of "throws" in place of the three values possible with the existing part. We are going into the question of whether the advantages accruing from this alteration would be sufficient to warrant its adoption, and hope to have something further to say regarding the idea on this page in the future, as it certainly possesses possibilities. (*Reply to J. F. Botham, Colchester*).

BRAKE SHOES.—Your suggestion that we should introduce brake shoes is interesting. If made sufficiently small, the shoes could be fitted inside a Meccano Wheel Flange and in this way an efficient internal expanding brake could be constructed. The drawback to parts of this type is their specialised nature, but as the internal expanding pattern of brake is employed in many other forms of machines in addition to motor cars (hoist shaft brakes on cranes, for instance) they would have a fairly extensive field of application. We are giving this idea special attention. (*Reply to J. L. Reading, Bridport*).

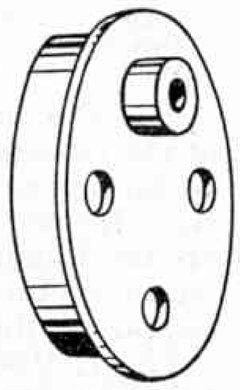


Fig. 5

MEMBERS OF THE H.R.C. ARE ENTITLED TO WEAR THIS BADGE WHICH IS BEAUTIFULLY ENAMELLED IN COLOURS

Hornby Railway Company

More Fun from Hornby Trains!

MEMBERS OF THE H.R.C. ARE ENTITLED TO WEAR THIS BADGE WHICH IS BEAUTIFULLY ENAMELLED IN COLOURS

IT has always been our wish that every boy who possesses a Hornby Train shall obtain 100 per cent. fun from his hobby.

How to make this wish come true is a problem over which we pondered for years, and not until 1928 did we feel that we had found an adequate solution. This was the formation of the now famous organisation known as the "Hornby Railway Company," the sole purpose of which is to look after the interests of all owners of Hornby Trains, and to enable them to get the best fun possible from their Hornby miniature railways.

The formation of the Hornby Railway Company was announced in these pages on 1st October, 1928, and the outburst of enthusiasm that greeted it proved beyond all doubt that its inauguration met the wishes of practically all Hornby Train owners. An astonishingly large number of applications for membership of the Company were received by the first post after the appearance of the announcement. During the succeeding months the stream continued, and to-day more than 11,000 Hornby Train enthusiasts are enrolled as members of the organisation, although it is little more than a year old.

While the number of applications for membership was in itself sufficient proof of the success of the venture, the letters that were received from young and old alike showed in an even more satisfactory way that the Hornby Railway Company had taken the model railway world by storm. Practical railwaymen and miniature railway enthusiasts united in giving the scheme a great welcome, and in fact, almost every one of the flood of letters received on the day following the announcement read: "This is the very thing we were waiting for."

A very noteworthy feature of the reception given to the Hornby Railway Company was the manner in which the four Railway Groups of the United Kingdom entered into the spirit of the venture. They supplied us with much intimate railway information, and were always ready to assist us and our young friends to the utmost extent possible, for they are as keen as we are that the Hornby Railway Company should be run exactly on the same lines as a real Railway Company.

How to Become a Member

Any owner of a Hornby Train Set, no matter what its size, may become a member. All he has to do is to fill in the official application form for a share of fun and pleasure, have his signature witnessed, and send the form to Headquarters with 6d. in stamps in payment for the official badge. On enrolment a handsome certificate is sent to him along with the badge, which is intended to be worn in his buttonhole. The badge, which is illustrated in the top corners of these pages, is beautifully finished in red and green enamel and bears a representation of a locomotive surrounded with the words "Hornby Railway Company."

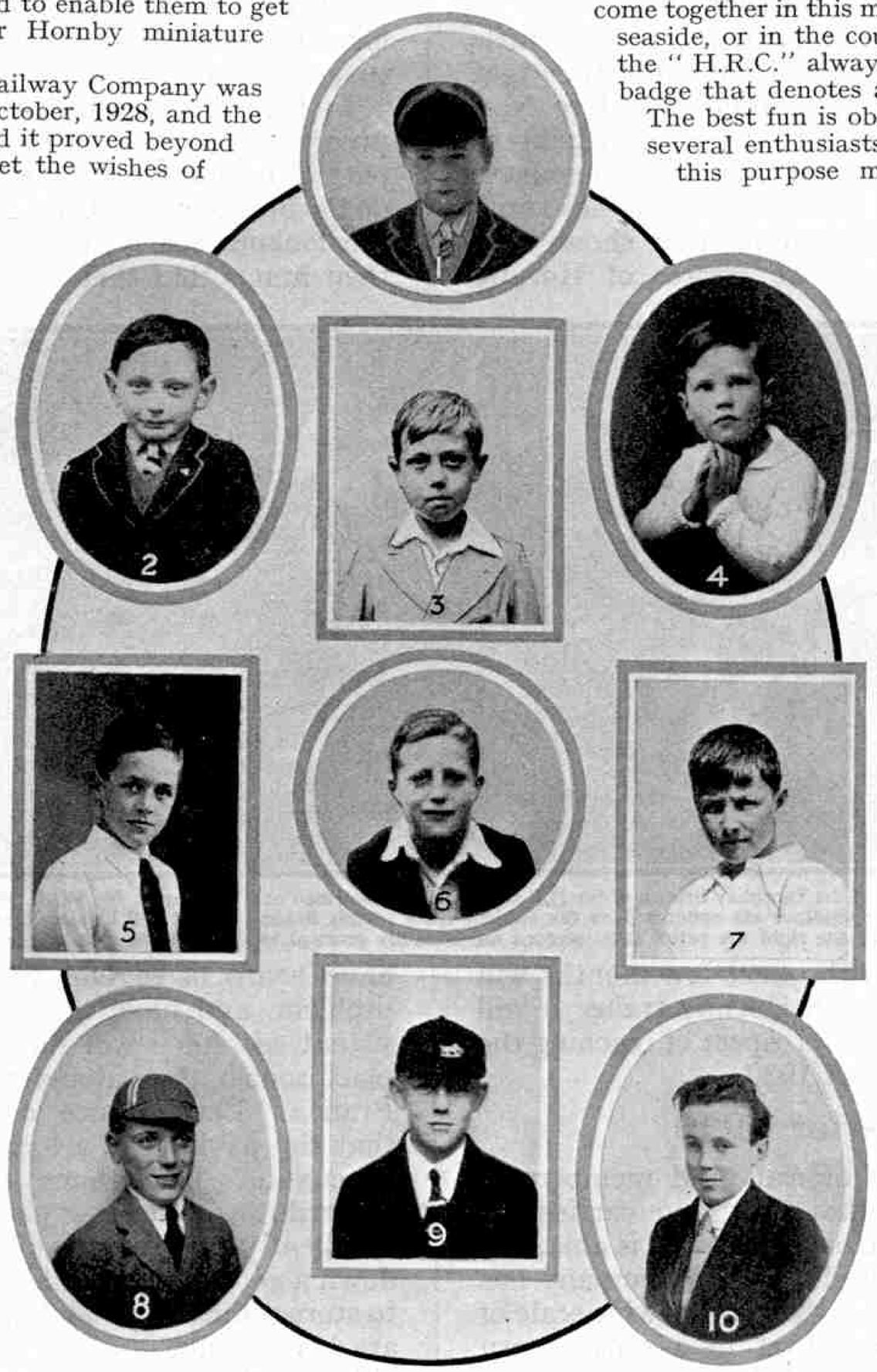
By means of this badge members recognise each other when they meet, and after a hearty handshake, conversation never flags between any Hornby Railway Company members who may come together in this manner! Whether at home, or at the seaside, or in the country on holiday, every member of the "H.R.C." always is on the look out for the official badge that denotes a kindred spirit.

The best fun is obtainable from Hornby Trains when several enthusiasts enjoy their hobby together. For this purpose members in any town, village or district, may form a Local Branch of the Hornby Railway Company. In organising this they are helped by the staff at Headquarters, an important part of whose work consists in encouraging and assisting in a practical manner in the formation of such branches. Each Local Branch is controlled by the members themselves, who appoint from among their number their own General Manager, Engineer, Traffic Superintendent, Stationmasters, Signalmen, Drivers, and any other officials that may be considered necessary for the adequate operation of the Branch.

Success of Branches of the H.R.C.

The success of the Branch movement has been as remarkable as that of the Hornby Railway Company itself. No fewer than 230 Branches have been formed, and of these 88 already have fulfilled the necessary conditions and have become incorporated with the Hornby Railway Company. A very large proportion of the remaining Branches anticipate obtaining the privileges of incorporation at an early date, and many others are in course of formation.

The official organ of the "Hornby Railway Company" is the "*Meccano Magazine*." Before the foundation of the H.R.C. the "*M.M.*" paid considerable attention to model railway matters, but now a special section of the Magazine is devoted entirely to the affairs of the Company. Brief reports are given of the progress of each affiliated Branch, with special reference to any developments of unusual interest, and thus each Branch benefits by the experience of every other Branch. In addition to the publication of Branch News and Notes, month by month articles on miniature railway working in all its aspects appear in the "H.R.C." pages of the Magazine, every issue of which contains articles and notes that will appeal strongly to every railway enthusiast.



Ten Thousand Members of the H.R.C.

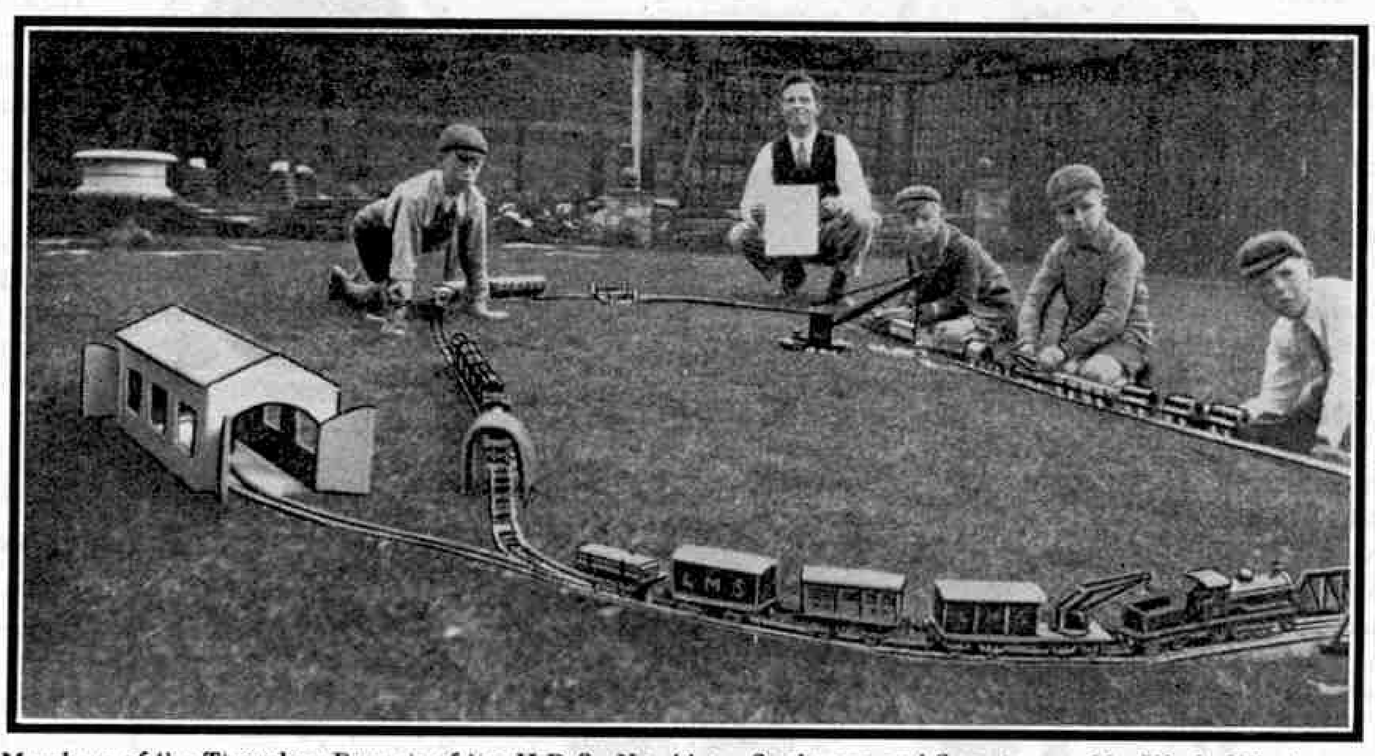
When the membership of the H.R.C. reached 10,000, we obtained the photographs of each thousandth member—and here they are! A jolly, smiling group of British boys—typical of the thousands who have joined the H.R.C. Here are their names with their H.R.C. numbers following:—

1. M. H. Richcord (10,000), Malvern; 2. J. E. Allin (1000), Irthlingborough; 3. A. F. Slattery (5000), New Malden, Surrey; 4. H. Day (9000), Walkeringham, Doncaster; 5. R. Whitworth (7000), Rochdale; 6. H. Pollitt (8000), Accrington; 7. Colin H. Harris (4000), Lyme Regis; 8. A. G. Fowler (6000), Gidea Park, Essex; 9. Kenneth S. Kirby (2000), Whitby; 10. Leopold P. Woods (3000), Sallins, Ireland.

A Happy New Year!

"A Happy New Year" to all members of the Hornby Railway Company and of the numerous Branches in all parts of the world! As yet the Company is very little more than a year old, and this is really the first time that I have had the opportunity of sending collective New Year greetings to the members. It is very gratifying to find that only fifteen months after the first announcement of the formation of the Company my wishes reach more than 11,000 members, a number that shows how well the organisation has met the desires of Hornby train users.

I hope that during 1930 every member will make a special effort to do his best to enable the Company to go ahead at an even more satisfactory rate than in 1929. If each of them were to obtain only one recruit the strength of the Company would be doubled. To do this is not very difficult, and if to the increased strength so obtained we add the thousands of boys who during the next few months will make their first acquaintance with Hornby trains, it will be seen that there is a reasonable prospect of reaching the figure of 30,000 before the end of 1930.



Members of the Thornbay Branch of the H.R.C., No. 44; Chairman and Secretary: Mr. W. A. Winstone. Realistic operations are conducted on the outdoor track of this Branch, and it will be seen that on the train on the right the petrol tank wagons are correctly grouped together at the rear of the train.

Making Plans for 1930

This is a suitable time for officials and members of Branches to review the work that they have carried on. The success that many of these have achieved is amazing, especially when it is remembered that the Company has been a pioneer in the organisation on a world-wide scale of model railway enthusiasts, and that in a sense every Branch yet founded could be regarded as an experiment. It speaks well for the enthusiasm of members and the attractive nature of the hobby that so many have been successful. Nearly 100 Branches actually have been incorporated with the H.R.C., and more than 150 are being formed and have excellent prospects of securing incorporation early in the present year.

To those holding official positions in the Branches I strongly recommend the idea of collecting members together for a few minutes in order to discuss plans for the future. In the past some Branches may have embarked upon schemes that have turned out unsatisfactorily, and in others difficulties due to lack of resources have been encountered. Even from failures much may be learned, however, and members should be encouraged to speak frankly on all Branch affairs, and to suggest means for improvement in the future.

In Branches in which this course is followed excellent progress is assured, for every member will have had some part in formulating the programme and will be ready to do his best to carry it out successfully. Those who are on the lookout for New Year resolutions should make up their minds that they will do all they can to increase the membership of the Hornby Railway Company in general, and of their Branch in particular, and to help in the great object of getting as much realistic fun as possible from operations on the Branch layout.

Branch Rooms

Since writing the note on the difficulty of obtaining Branch Rooms that appeared in the "*M.M.*" for December, 1929, I have heard of several very ingenious solutions to this problem, and have come to the conclusion that a persistent secretary will find a room in the most unlikely place sooner than abandon the idea of forming an active Branch. For instance, one energetic official discovered that the pavilion of a local Lawn Tennis Club remained untenanted throughout the winter and immediately secured it as a meeting place. For this purpose it serves excellently, for there is plenty of space in which to put down a good layout, and cupboards are available in which to store rolling stock and materials from which accessories are being built.

In another instance the waiting room of a station is given over to a Branch for its weekly meetings. This is not perhaps an ideal arrangement, for material must be cleared away at the end of each meeting. But the room is spacious and members have enlisted the interest of railway workers attached to the station, from whom they receive many valuable hints. The help received makes up for the inconvenience of using temporary layouts, while meeting on railway premises goes a long way towards creating the right atmosphere in the Branch.

Branch Notes

SHREWSBURY.—An extremely interesting visit has been paid to the local engine repair sheds. Among many interesting items seen were the turning down of worn wheels; a mechanical wood chopper that split small logs into uniform pieces ready for the lighting of the engine fires; and two cranes, the larger of which could lift any engine in use on the system. A demonstration was given of the working of a turntable, the boys being allowed to assist in turning a locomotive. Branch roll: 15. *Secretary:* Mr. W. F. C. Winkles, c/o Della Porta's, Shrewsbury.

PLYMOUTH (ST. BARTHOLOMEW'S).—A very enjoyable visit was paid to the Friary Engine Sheds, S.R., members being taken from one place to the other on the footplate of an engine. The third number of the Branch magazine sold out on the day of publication. To one meeting the new Branch Chairman brought his mail train and ground apparatus. This was included in the layout and used to illustrate a talk on the Travelling Post Office. A permanent track is being constructed. Branch roll: 57. *Secretary:* Kenneth Wills, 1, Beechwood Avenue, Mutley, Plymouth.

FIRST ALVA.—Timetable working is now a regular feature and the track has been so arranged that eight trains can be run at once. A Branch magazine is to be started, and preparations for an Exhibition are in full swing. Branch roll: 13. *Secretary:* Wm. McArthur, 72, Queen Street, Alva, Clackmannanshire.

EVENLODE.—Very successful track meetings have been held. At one meeting the track extended into two rooms and flashlight apparatus was used for signalling trains. At each meeting members take turns in giving short talks on G.W.R. locomotives. These always are followed by animated discussion. Branch roll: 7. *Secretary:* George Gorman, Evenlode Rectory, Moreton-in-Marsh, Glos.

STROUD GREEN.—A Branch room has been secured and it is intended to establish a permanent layout as soon as funds permit. Plans are being discussed and it is hoped very soon to make a start on the work. An interesting visit has been paid to the King's Cross Engine Sheds. Branch roll: 11. *Secretary:* E. C. Burrage, 47, Connaught Road, Stroud Green, London, N.4.

GLOUCESTER.—A very extensive course of lectures has been planned for the winter evenings. These will be given by railwaymen of all grades. The first lecture was on "*Platelaying*," and the next on "*Electric Train Lighting and Steam Heating*." These were very instructive, and members are eagerly looking forward to the remaining lectures in the series. Another visit to the G.W.R. loco sheds is being arranged. Branch roll: 10. *Secretary:* G. T. Clark, 66, Falkner Street, Gloucester.

NEW EARSWICK (YORK).—A new Branch room has been found and a large permanent track laid down. Signals are operated from a central signal cabin. The main station of the layout is so large that it has been found necessary to appoint two stationmasters—one for passenger and the other for goods traffic. Electric bells and lighting apparatus have been installed. Timetable working is carried out, H.R.C. Timetable Forms being used, and platform tickets, price 1d., are issued to visitors. A series of 24 locomotive tests have been arranged for the season, and all the Branch engines have received names. A library has been started. Branch roll: 10. *Secretary:* S. Bruce, 67, Rowan Avenue, New Earswick, York.

LYTHAM CENTRAL.—A permanent layout is being laid on a shelf raised on trestles. Electric lighting has been successfully installed in the club room by two of the members. Regular visits are paid to the goods yard at Lytham, many valuable operating hints being obtained in this manner. It is intended to model the Branch goods yard on the Lytham goods yard. A Lecture by the Chairman on his visit to the Meccano Factory proved interesting. Branch roll: 13. *Secretary:* A. W. Parkinson, 44, Clifton Street, Lytham.

WALGROVE (CHESTERFIELD).—The club room has been enlarged considerably and work is now carried on more conveniently. A selection of fretwork and woodwork tools has been obtained and they are to be used in making various accessories. The members of the Branch are to produce a play in order to add to Branch funds. Branch roll: 10. *Secretary:* S. Wheatcroft, 50, Walton Road, Chesterfield.

OVERSEAS

NELSON (NEW ZEALAND).—Arrangements are being made to reset the permanent line where necessary. The track is very large and has been laid down outdoors, each member having a section to keep clear of weeds. Sports are proving very popular and include Football and Rifle Practice. Many members are excellent shots, and Competitions are often arranged. Branch roll: 37. Secretary: F. Curran, 9, Wainui Street, Nelson, New Zealand.

(Right) Cheery members of the Solihull Branch, No. 45, exhibiting their Hornby locomotives at the close of a demonstration to a number of visitors.

(Below) H.R.C. members at Beckenham combine their Hornby Railway material in order to build up an interesting outdoor track with extensive sidings.

Further Branches in Course of Formation

The following new Branches of the Hornby Railway Company are at present in process of formation and any boys who are interested and desirous of linking up with this unique organisation should communicate with the promoters, whose names and addresses are given here. All owners of Hornby trains or accessories are eligible for membership and the various secretaries will be pleased to extend a warm welcome to all who send in their applications:—

BEDFORD—H. M. Darlow, 1, Burnaby Road, Bedford.

BIDEFORD—H. L. Farr, Lavington House, Bideford, Devon.

BURRY PORT—Peter Griffiths, "Glanmor," Gors Road, Burry Port, S. Wales.

CATFORD—F. B. Graves, 133, Bromley Road, London, S.E.6.

EDGBASTON—H. R. Jerston, 36, Cavendish Road, Edgbaston, Birmingham.

KING'S NORTON.—John E. Wilson, "Highgate," Meadow Hill Road, King's Norton, Birmingham.

LEICESTER—B. A. King, Cromer House, Park Hill Drive, Aylestone, Leicester.

LEICESTER—F. G. Musson, "Fowey," 20, Barrington Road, Leicester.

LONDON, S.W.13—D. J. Higgens, 28, Hillersdon Avenue, Barnes, S.W.13.

NEWPORT, I.O.W.—Arthur G. Odell, "Collesmere," Carisbrooke Road, I.O.W.

OLDHAM—W. Beswick, 30, Hooper Street, Oldham.

POOLE—J. Blackwell, "Benachie," Dorchester Road, Longfleet, Poole.

STAFFORD—W. C. Hawley, 172, Weston Road, Stafford.

WOODBOROUGH—C. P. Foster, The Manor, Woodborough, Notts.

OVERSEAS

NEW ZEALAND—Ian T. G. Johnstone, c/o Govt. Printing & Stationery Dept., Wellington, New Zealand.

SOUTH AFRICA—H. Jacobsen, 169, Loveday Street, Clifton, Johannesburg, South Africa.

Further H.R.C. Incorporated Branches

82. PERSHORE—David Ross, Church Street, Pershore, Worc.
83. CLIFTON (BRISTOL)—M. S. Macfarlane, 4, Royal York Crescent, Clifton, Bristol.
84. TOOTING AND DISTRICT—A. Walker, 137, Byrne Road, Balham, London, S.W.12.
85. THE ROYAL ORPHANAGE—W. H. J. Bratt, The Royal Orphanage, Wolverhampton.

OVERSEAS

86. BELGRANO (ARGENTINA)—James E. Nickson, Vidal 2180-Belgrano, F.C.C.A. Buenos Aires, Argentine, South America.

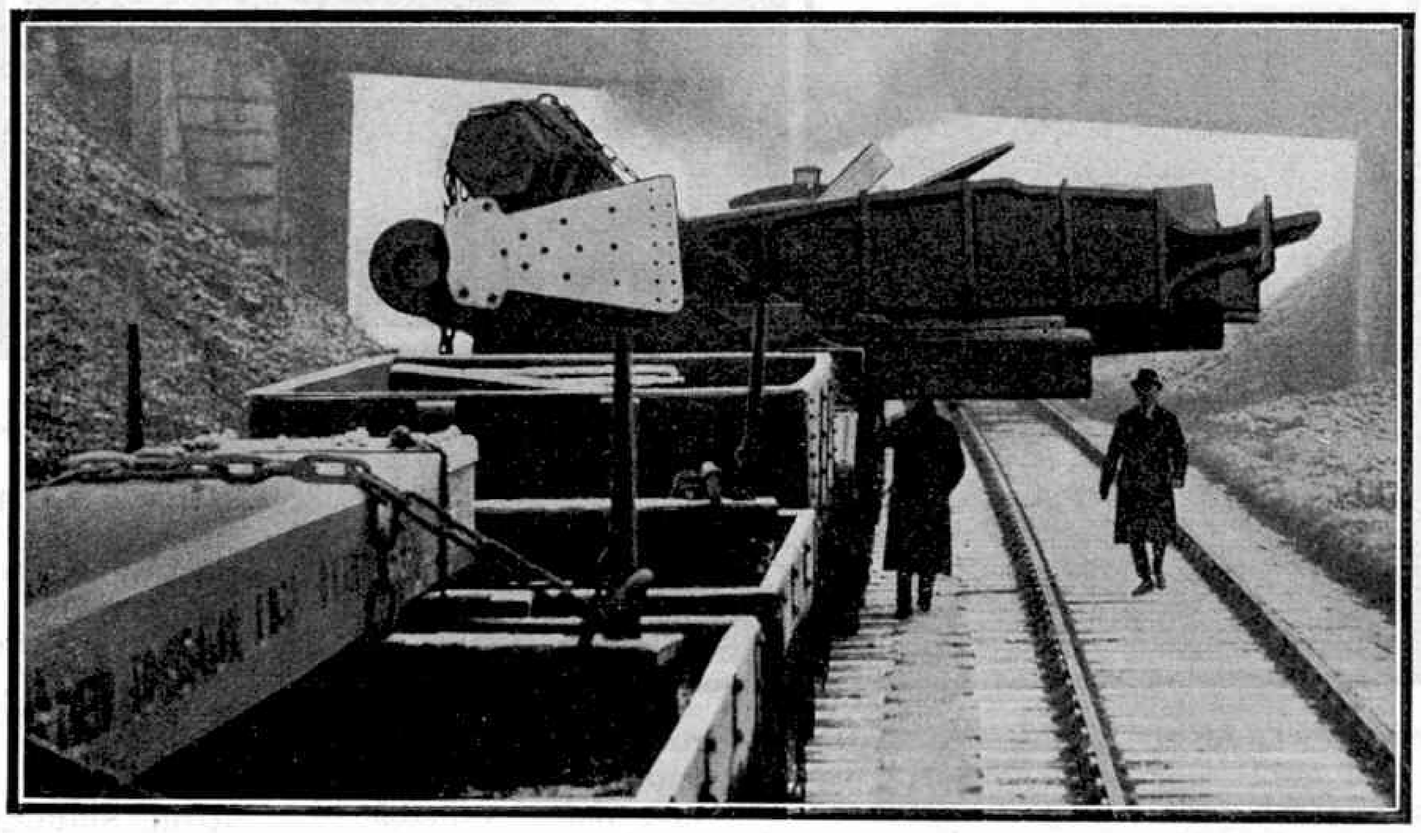
Hornby Railway Company

JUNIOR SECTION

XIII.—Interesting Express Goods Trains

THE subject of train formation has already received attention on these pages, but it is a branch of railway working that is of such great general interest that we propose this month to deal further with it, chiefly in connection with special types of goods traffic.

One reason for the great interest displayed in this subject is that a correct understanding of it helps more than anything else to make model railway working thoroughly realistic. Locomotives and rolling stock are the chief features of any model railway, and their incorrect use is a very serious defect. Accessories and scenic effects are less important. They certainly help in producing correct atmosphere, and if they are badly grouped or omitted the appearance of a good layout may be spoilt. But the effect of running trains that are incorrectly assembled is far more serious, and the use of the most elaborate stations, signals, bridges, tunnels and other scenic effects does not provide sufficient compensation for defects of this kind, which may quite easily be avoided.



The stern frame of the "*Olympic*" en route from Darlington to Middlesbrough. Hornby train enthusiasts will find it interesting to arrange special trains having "out of gauge" loads of this kind for which special working is necessary.

As an instance of wrong assembly we may note that a goods train that includes a Trolley Wagon, a Milk Tank Wagon, a Gunpowder Van and two Timber Wagons would never be seen on a real railway. Yet letters are occasionally received which seem to indicate that readers run combinations of this extraordinary type on their layouts. Every railway enthusiast quite rightly desires to possess a good variety of stock, and where a system is developed from a simple train set by additions made at intervals, it is natural to purchase vehicles of different types. To this there can be no objection, but in the interests of realism it is better to use them as in actual practice instead of indiscriminately coupling them behind the first available locomotive and sending them round the track looking like nothing on earth! The purpose of the present article is to help readers to avoid this and to show how they may use a variety of wagons while following interesting railway practice.

An Easily Assembled "Mixed Goods" Train

A realistic goods train of the "mixed" variety may easily be made up from the wide range of vans and wagons of the Hornby System. A mixed goods train does not include rolling stock of all kinds, but is composed of Open Wagons and Luggage Vans, with perhaps two or three Lumber Wagons, the rear being brought up by a Brake Van. There is room for great variety, and I may remind readers that greater realism will be obtained if the trucks of each type are distributed along the train than if vehicles of one type are grouped together.

A long train of open trucks has an extremely effective appearance, as the most casual visit to a local goods yard or to a busy section of line will show. These may be full of coal or may be empty wagons returning to the pits for further loads.

One class of traffic that offers very interesting opportunities to model railway owners is the conveyance in express goods trains of "perishable" foodstuffs. Goods classed under this heading usually are carried in special vehicles fitted with automatic brakes, and the trains are scheduled to run at high speeds. In many cases they are hauled by express passenger locomotives bearing the head code of an engine at the head of an express train.

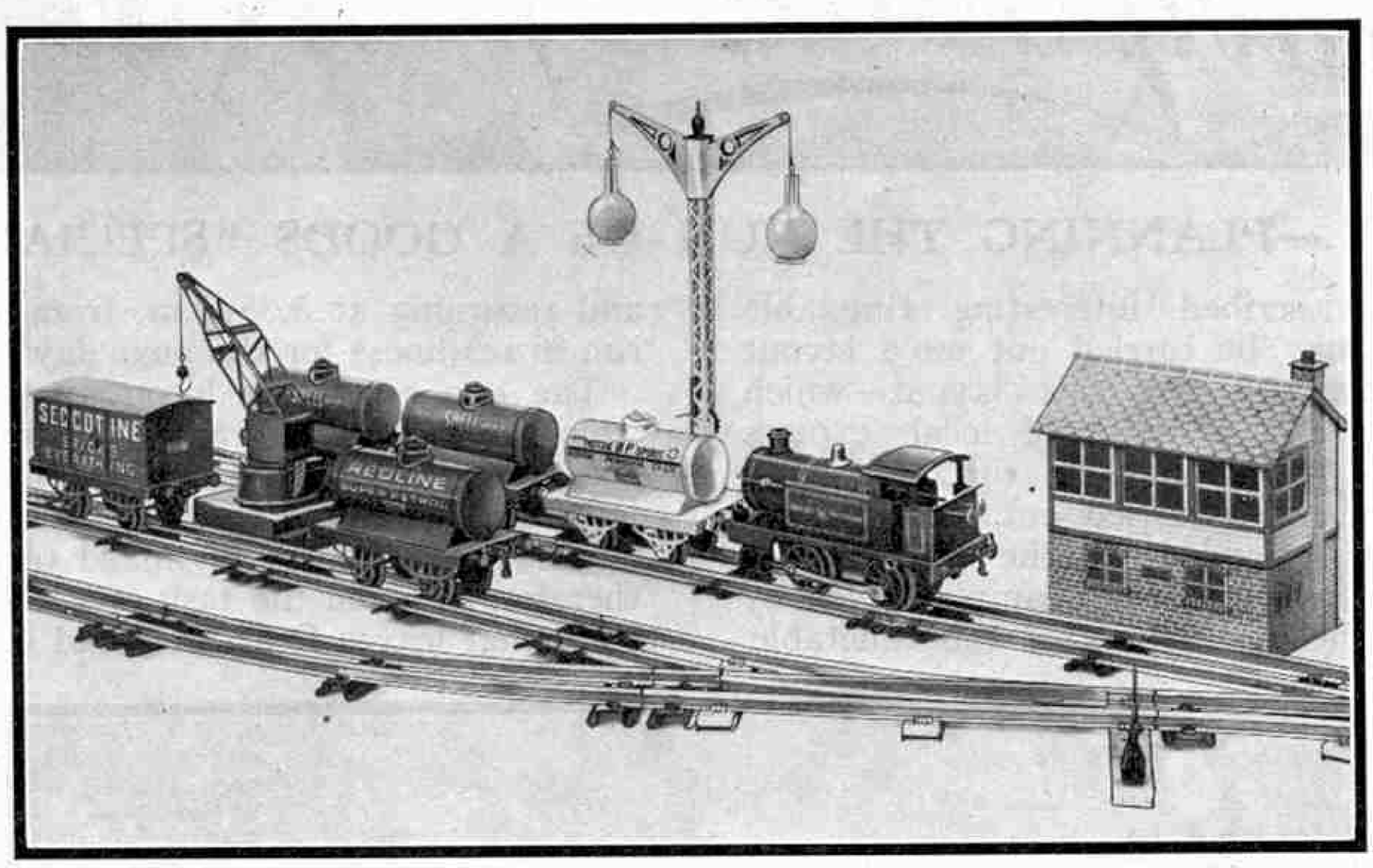
Named Goods Expresses

The enthusiast who wishes to run express goods trains of this type has a wide choice of examples to follow. In recent years the practice of naming such trains has become general. The title given to any particular train may suggest its destination or the nature of the goods it carries. Occasionally it is a witty abbreviation, a very good example of this being the name applied to the G.W.R. 9.35 p.m. fast goods from Basingstoke. This is known as the "*B.B.C.*," for the principal goods depots with which it is concerned are at Basingstoke, Birmingham and Crewe.

Other interesting named goods trains on the G.W.R.

are the "*Sparagras,*" which runs from Worcester to Crewe and presumably is named after the vegetable asparagus, which is grown in large quantities in Worcester; the "*Sauce,*" which, strange to say, runs to Worcester and not from it; the "*Carpet,*" so-called because it originates at Kidderminster, and the "*Pasty,*" which presumably derives its name from the well-known delicacy of Cornish origin, for it is the 7.20 a.m. Penzance to Plymouth goods train.

A very interesting express goods train that may serve as an example to model railway enthusiasts is the "*Grocer.*" This runs from Southall to Crewe and the North by way of Leamington and Wolverhampton. It has received this name because its load consists of tea, coffee, margarine and similar household goods. A train with a similar name is the "*Bacon,*" which carries goods of the type suggested by its name, and other perishables from Gloucester to Cardiff.

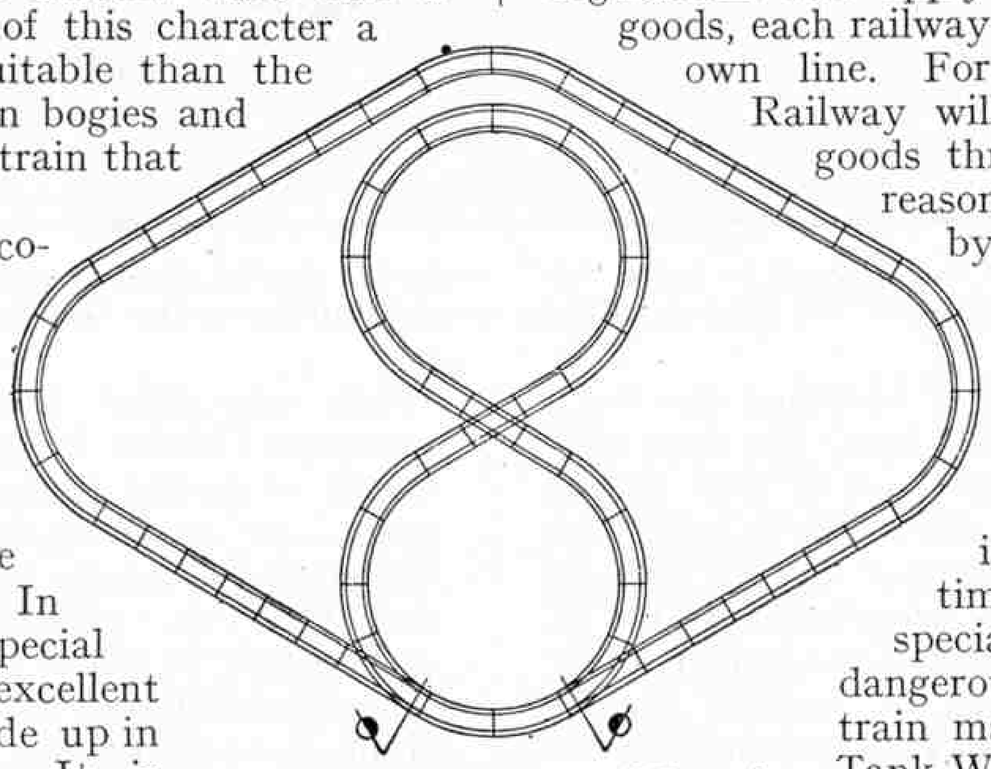


Shunting empty petrol tank wagons in the goods yard at Binnswan in making up a train of empties for return to refineries.

A Realistic Make-up for Perishable Foodstuffs

Quite a realistic "perishable" train of the type of the "*Grocer*" or the "*Bacon*" may be made up with Hornby rolling stock. For instance, the assembly may consist of Luggage Vans, with Biscuit Vans and a Refrigerator Van. For a train of this character a No. 2 Luggage Van is more suitable than the smaller one, for it is mounted on bogies and this is more suitable for use on a train that travels at high speed.

The choice of a suitable locomotive also is very important. On the Great Western Railway, 2–6–0 "Moguls" with 5 ft. 8 in. driving wheels are largely used for traffic of this kind, and the new locomotives of the "Hall" class also are eminently suitable for working fast goods expresses. In the Hornby System the No. 1 Special Tender Locomotive would do excellent work at the head of a train made up in the manner already described. It is capable of hauling heavy loads, for its mechanism is powerful, its driving wheels of moderate diameter, and the whole weight of the locomotive is available for adhesion purposes.



Suggested Layouts (No. 7)

2′ **Radius** (as illustrated): 28 Curves, 28 Straights, Acute Angle Crossing, R.H. Points and L.H. Points.

1′ **Radius:** 13 Curves, 14 Straights, 4 ½-Straights, Acute Angle Crossing, R.H. Points and L.H. Points.

Often railway companies are called upon to convey goods of a very special type, and traffic of this kind usually is conveyed in complete train loads, or a consignment may form part of an ordinary goods train. The use of isolated wagons in an ordinary goods train intended for special purposes should therefore be avoided as unrealistic. For instance, a single petrol wagon should not form part of a goods train, a position in which it is very rarely seen, the usual method of conveying petrol being in a consignment of several tank wagons, kept together in one section of the train, or in special trains that consist of tank wagons only. The reason for this is that petrol is readily inflammable and therefore is classed under the head of dangerous traffic.

Stringent measures govern the working of trains carrying petrol or other dangerous materials such as gunpowder. The tanks or wagons in which they are carried must be marshalled as far away as possible from the engine; they must be examined carefully at each stop in order to make sure that the bearings are not running warm; they may not be "fly shunted," but during marshalling operations must be carefully and almost delicately handled; and the guard may not have a fire in his van, even on the coldest winter day. It will be realised that consignments of this nature are not exactly welcomed by the traffic staff responsible for their safe handling.

The list already given does not exhaust the special regulations that apply to the conveyance of dangerous goods, each railway company making rules to suit its own line. For instance, the Great Western Railway will not convey certain dangerous goods through the Severn Tunnel. The reason is that an accident accompanied by fire or explosion would create terrible havoc and perhaps ruin the costly workings.

"Dangerous Traffic" on a Hornby Layout

On a Hornby Railway there is no danger of this kind, but at times it is interesting to run a special train for the conveyance of dangerous goods. For instance, a petrol train may be made up from the Petrol Tank Wagons of the Hornby System, one or two Open Goods Wagons being at the head of the train in order to separate the readily inflammable petrol from the engine. In running such a train the usual regulations should be observed, the wagons being handled as if they contained real petrol.

Another class of special traffic that provides interest is the carriage of what is usually classed as "out-of-gauge" traffic, and for those who possess a Hornby Trolley Wagon this will provide excellent fun.

XV.—PLANNING THE RUN OF A GOODS "SPECIAL"

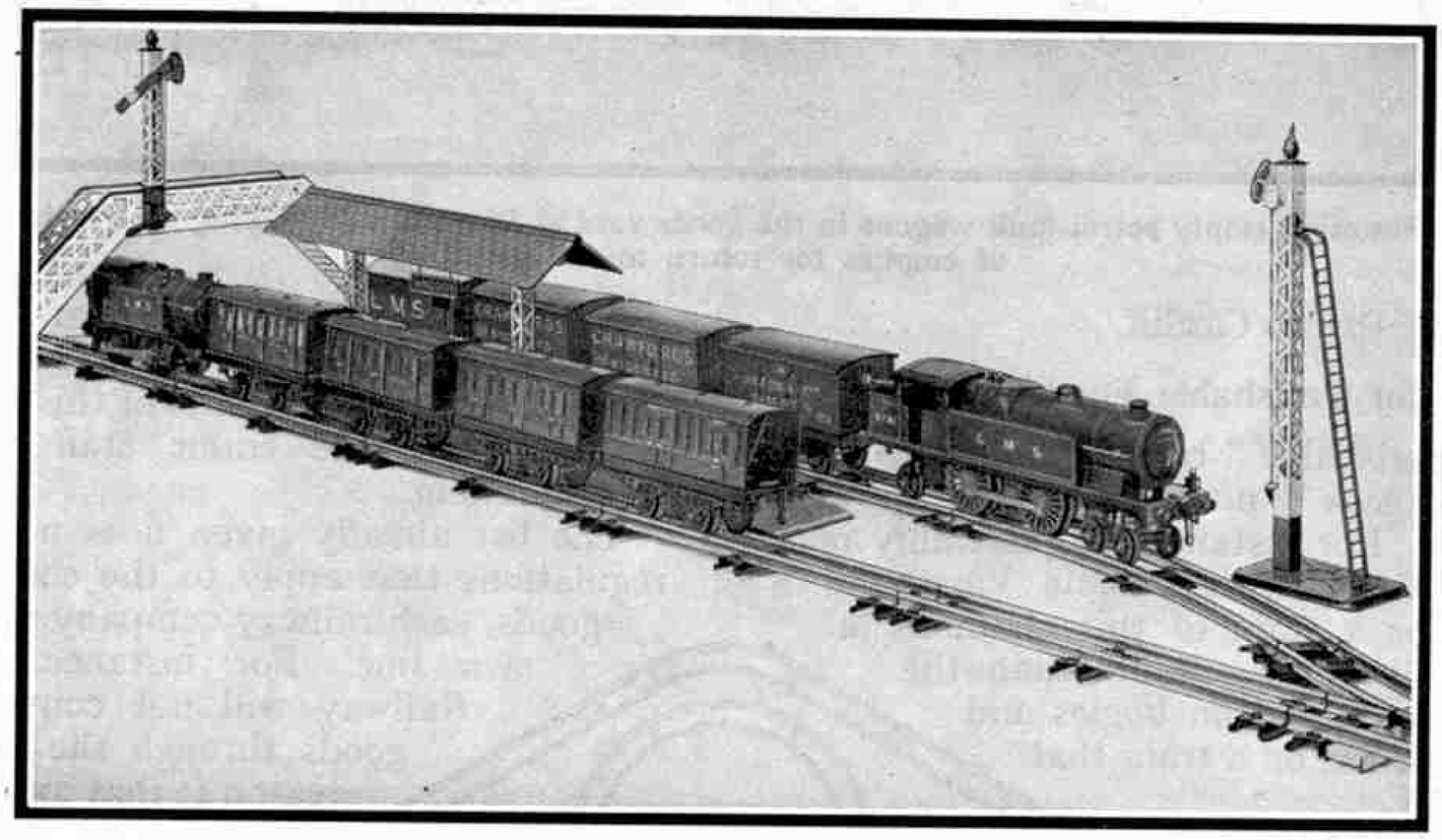
LAST month we described interesting timetable operations that may be carried out on a layout having four stations. On this layout—which is reproduced on page 57—a series of local, express passenger and goods trains may be run, and very realistic movements may be carried out with the aid of the passing loops provided at the intermediate stations. We pointed out that the examples given by no means exhausted the possibilities of the timetable, and this month we propose to consider other features of interest.

We may remind readers that the four locomotives used are—a No. 2 Special Passenger Tender Locomotive, a No. 1 Goods Tank Engine, a No. 1 Special Tank, and a No. 2 Special Tank. If the movements of these locomotives are followed on the timetable reproduced on the opposite page, it will be found that in each case the engine returns to its shed at the end of the "day's" work. For instance, the No. 1 Special Tank is the locomotive that hauls the four local trains scheduled. This is stationed at A, and during the round period covered by the timetable it hauls two trains in each direction, concluding its "day's" work by taking the 8.14 local from D to A, arriving at A at 8.16.

Similarly the No. 2 Special Passenger Tender Locomotive commences its day's work by hauling the 8.6 express passenger train from D to A. It returns on the 8.7½ passenger express from A and makes the double journey again at the head of the 8.16 from D and the 8.17½ from A respectively.

The express passenger trains hauled by this locomotive are the "crack" trains of the system for which this timetable was devised. The rolling stock used throughout is composed only of No. 2-3 Hornby Pullman Coaches, and the train corresponds to the "*Southern Belle*" of the Southern Railway. This famous train makes two journeys each way between Victoria and Brighton, leaving Victoria on the first trip at 11.15 a.m. and returning at 5.35 p.m. from Brighton on its final run in readiness for the next day's work.

The two remaining locomotives are given work for which they are exactly fitted. For instance, the ordinary goods trains of the system are hauled by the Hornby No. 1 Goods Tank. The No. 2 Special Tank is a powerful locomotive intended for mixed traffic operation. To it therefore is given the task of hauling the express goods train that leaves D at 8.11, and in addition it is placed at the head of the 8.9 passenger express from A, which is not a Pullman train.



The "down" local about to leave "B" while the Special Goods Express, conveying foodstuffs and other perishables, passes through on the loop line.

The timetable to which we are working is so arranged that each day's work is complete. At the end of the round of operations not only the locomotives, but also all rolling stock is returned to the place from which it started. This is an ideal system that may more easily be carried out on model railways than in real practice, on which operations are far more complicated. Heavy passenger traffic in one direction at rush hours, and traffic of special type are among the causes of disturbance that make working difficult, and for the sake of variety and realism instances of these have been introduced into the timetable.

The first of these concerns the No. 2 Special Tank. An examination of the timetable shows that this returns from D to A at the head of the 8.11 goods express. Later we find that at D are the coaches of the 8.9 express passenger train that it brought from A on its first run. These should be returned to the station from which they came in readiness for the next day's work. But no locomotive is readily available, and one can only be provided by transferring the No. 2 Special Tank to D. It may be returned by running light or by double heading. In both cases the journey is unremunerative, but less dislocation to ordinary traffic is caused by running the engine at the head of a train going in the same direction than by running it light. In the present instance,

therefore, the No. 2 Special Tank at A may be attached as the pilot engine to the express passenger train that leaves A at 8.17½.

The coaches to be transferred from D to A leave at 8.19 with the No. 2 Special Tank at their head. They may return empty but when traffic is heavy, they may form a relief train to the 8.16 express.

The running of special trains is far more exciting than arranging for the mere return of a locomotive to its shed. On real railways special trains are run for many purposes. When traffic is very heavy, for instance, at week-ends in summer and on public holidays, it often happens that quite a number of expresses are run in two or more portions. Relief trains of this kind usually are run at short intervals and good locomotive work is necessary in order that one portion may not delay that following.

UP							
Station	Local	Ex. Pass.	Local	Ex. Pass.	Goods	*Special*	Ex. Pass.
A. Dep.	8.0	8.7½	8.8½	8.9	8.12½	*8.15*	8.17½
B. Dep.	8.0½	...	8.9	...	8.13	...	...
C. Dep.	8.1½	...	8.10	...	8.15	...	...
D. Arr.	8.2	8.8½	8.10½	8.10	8.15½	*8.16½*	8.18½

DOWN							
Station	Goods	Local	Ex. Pass.	Ex. Goods	Local	Ex. Pass.	Empty Coaches
D. Dep.	8.0	8.3½	8.6	8.11	8.14	8.16	8.19
C. Dep.	8.2	8.4	...	...	8.14½	...	...
B. Dep.	...	8.5	...	...	8.15½	...	...
A. Arr.	8.3½	8.5½	8.7	8.12½	8.16	8.17	8.20

The chief difficulty in special running of this type is the provision of rolling stock and suitable locomotive power, and things are made easier by the fact that to a certain extent the demands may be foreseen. It is when an out of course "special" is to be run that the task of the Traffic Controller becomes really troublesome. For instance, he may be called upon to arrange the running of a train of perishable goods, such as fish or other foodstuffs, that must be hurried to its destination as quickly as possible. Such a train must not be held up more than is necessary to maintain the punctuality of the regular service.

It is the necessity for fitting in the timing of a "special" among other trains on regular schedules that makes these working arrangements interesting. At times it is necessary to divert the "special" into a passing loop or siding in order to allow the passage of a regular passenger express; at other times the "special" itself may overtake a slow goods or a local passenger train, which is switched off the main line in order to make way for it.

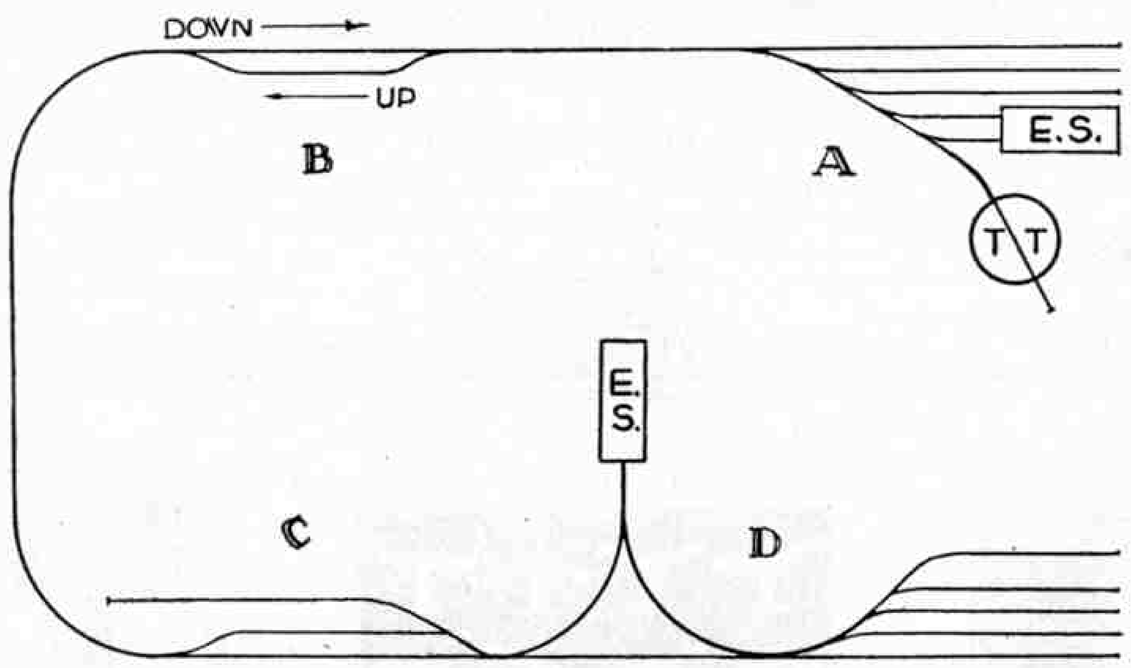
Running traffic of this kind is almost an everyday occurrence on our great railways and to work in "specials" without causing delay demands considerable skill. On a miniature layout the introduction of additional trains increases very greatly the enjoyment that may be obtained by working to a timetable. It also helps to make operations realistic, and ability to work in such trains in a neat and effective manner is a feat on which the Hornby train enthusiast may justly pride himself.

In order to show how a train of this kind may be run on the model railway layout reproduced, let us imagine that we are in the position of the Train Controller at A, and that at 8.12 we receive a sudden call to arrange for the running of a food "special" to D. The goods are so urgently required at their destination that they cannot be allowed to wait until the departure of an ordinary goods train, and therefore must be conveyed by means of a special express goods. We are informed that the train will be made up by 8.14 or shortly afterwards, and we must find out how to work it through the traffic already booked to be on the line without unnecessary delay to any train.

The first step is to enquire of the locomotive department if there is at hand a locomotive that is capable of hauling a well loaded goods train at high speed from A to D. The District Locomotive Running Superintendent examines the rostering of the various locomotives and finds that a No. 2 Special Tank from his depot is at that moment working a return trip from D, where it is due to arrive with a regular express goods train at 8.12½. We have already seen that in the ordinary course of things this locomotive would return to D at the head of the 8.17½ express passenger train, on which it would act as pilot engine.

The Superintendent immediately decides that instead of piloting the 8.17½ from A, this locomotive shall work the "special," for it is quite capable of hauling it. Accordingly he gives orders that after taking water the No. 2 Special Tank engine shall proceed straight to the goods yard to haul the long train composed of luggage, biscuit and refrigerator vans. He then reports that a suitable locomotive has been provided.

In the meantime we have been examining the working arrangements in order to see how best the special can be run. A "down" local leaves D at 8.14 and arrives at A at 8.16. An express follows, its departure time from D being 8.16. A path for the "special" can only be worked out by allowing it to pass these trains en route. The only available passing loops are at B and C, and therefore the timing of the "special" must be so arranged that the meetings of the trains take place at these intermediate stations.



A layout on which many interesting operations may be carried out.

After some consideration we fix 8.15 as the departure time. This will enable the "special" to arrive at D well in advance of 8.19, when the locomotive that hauls it is due to return to A at the head of the train that may be either a relief express or simply empty coaches returning to A. Thus the No. 2 Special Tank will be able to return to its home shed at its usual time, and with more productive mileage to its credit than normally is the case.

The running arrangements for the "special" are then wired or telephoned to the signalmen in the boxes between A and C. Each of these weighs up the situation as far as it concerns themselves and (*Continued on page 31*)

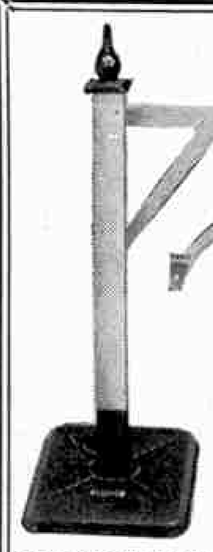
HORNBY SERIES

HORNBY ACCESSORIES

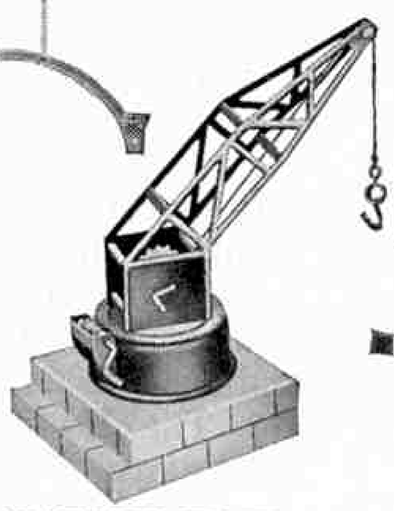
HORNBY SERIES

There is a splendid range of Hornby Accessories in the Hornby Series, built in perfect proportion and beautifully finished. With these realistic Accessories the most elaborate model railway system may be constructed and operated in exactly the same manner as a real railway.

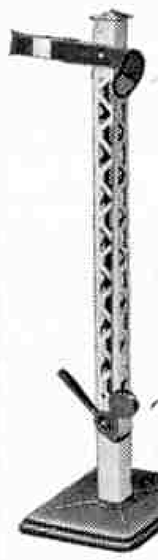
A selection of Hornby Accessories is illustrated below. Your dealer will be pleased to show you the full range.



LOADING GAUGE
Price **1/9**



PLATFORM CRANE
This is a useful accessory. The Crane revolves on its base and is fitted with a crank and ratchet mechanism for controlling the load. Price **4/-**



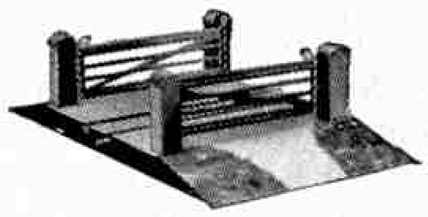
SIGNAL No. 1
Price **3/-** per pair. One "Home" and one "Distant."

RAILWAY ACCESSORIES No. 1
Miniature Luggage and Truck.
Price per set **1/6**

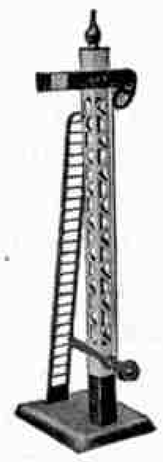
RAILWAY ACCESSORIES No. 3
Platform Machines, etc.
Price, per set **1/6**

RAILWAY ACCESSORIES No. 2
Milk Cans and Truck.
Price, per set **1/6**

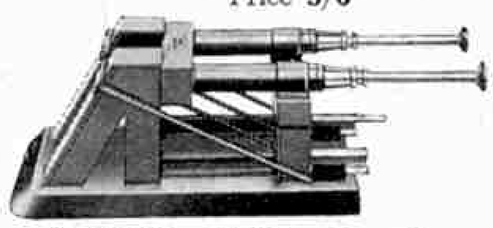
TELEGRAPH POLES
Price, per pair **3/6**



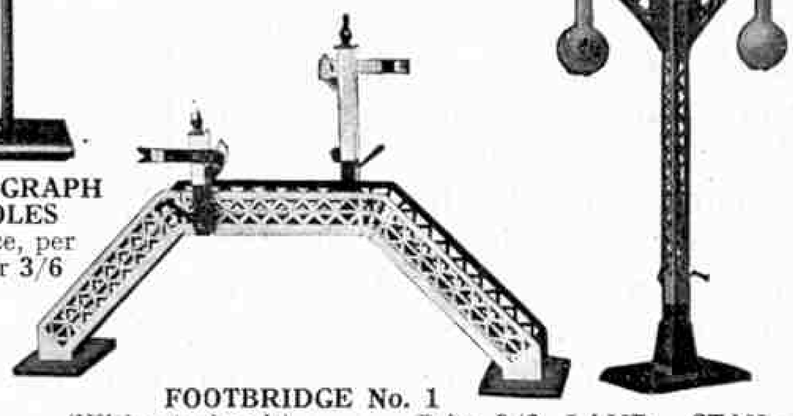
LEVEL CROSSING No. 1
This model is realistic in appearance and beautifully enamelled in colours. It is suitable for a single track only and has gauge 0 rails in position.
Price **3/6**



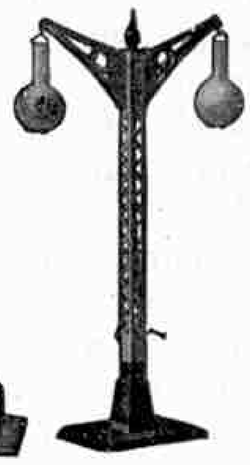
SIGNAL No. 2
Price **2/6** each.
"Home" or "Distant."



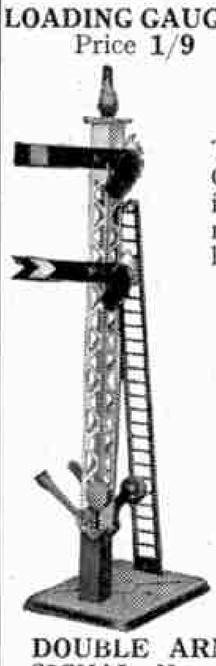
BUFFER STOPS No. 2 (HYDRAULIC)
Price **5/-**



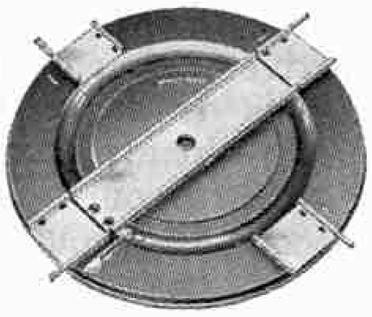
FOOTBRIDGE No. 1
(Without signals) ... Price **3/6**
FOOTBRIDGE No. 2
(As illustrated), complete with detachable signals Price **6/-**
Signals only, per pair **2/9**



LAMP STANDARD No. 2 (DOUBLE)
Electric flash-lamp bulbs may be fitted into the globes.
Price **4/-**



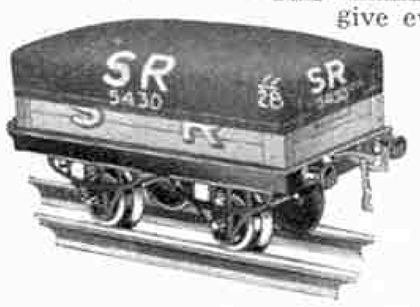
DOUBLE ARM SIGNAL No. 1
Price **3/9** per pair.
DOUBLE ARM SIGNAL No. 2
(As illustrated.)
Price **3/-** each.



TURNTABLE No. 1
Price **2/6**

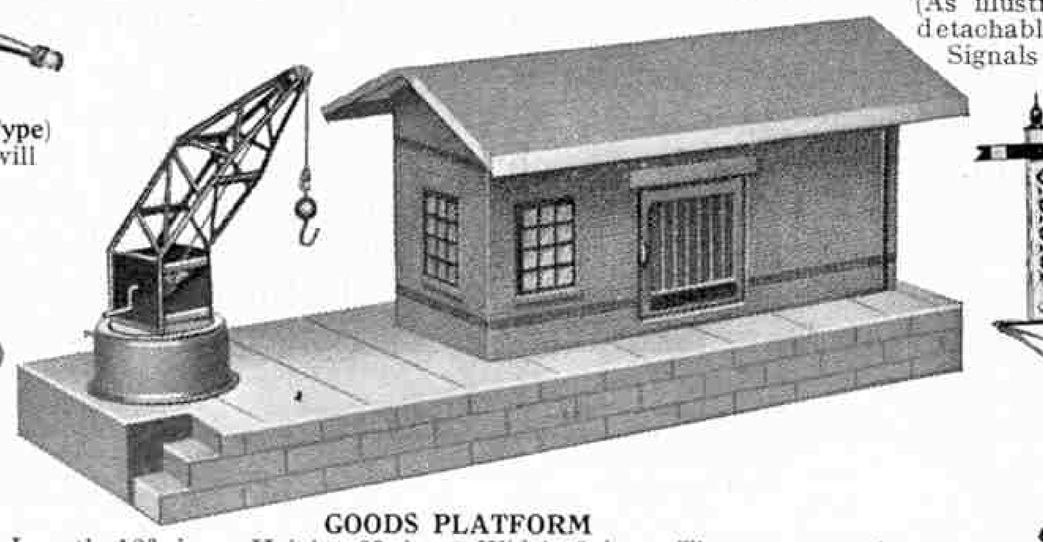
RAILWAY ACCESSORIES No. 4. This set comprises all the pieces that are contained in Railway Accessories Nos. 1, 2 and 3 ... ... Price **3/9**

OIL CAN No. 1 (Ordinary Type)
This miniature Oil Can will give every satisfaction.
Price **6d.**

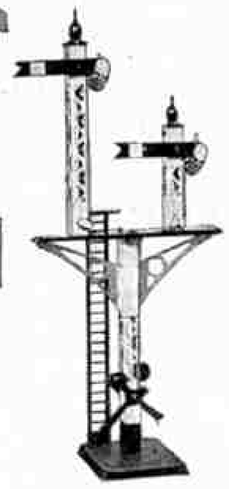


TARPAULIN SHEETS
Strongly made. Lettered L.M.S., N.E., G.W. or S.R. The above illustration shows one of the Tarpaulin Sheets fitted to a Hornby Wagon.
Price **6d.**

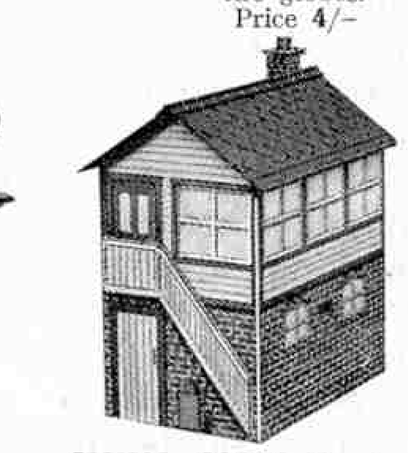
LAMP STANDARD No. 1 (SINGLE)
An electric flash-lamp bulb may be fitted into the globe. Price **3/-**



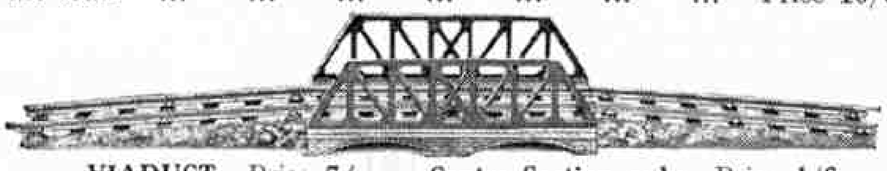
GOODS PLATFORM
Length 16¾ ins. Height 6¾ ins. Width 6 ins. The crane at the end of the platform revolves on its base. It is enamelled in colours and is fitted with a crank and ratchet mechanism for controlling the load ... ... Price **10/6**



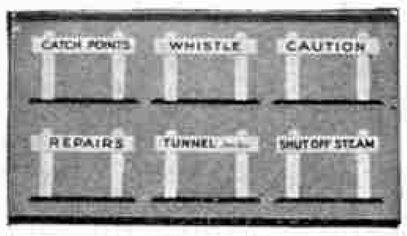
JUNCTION SIGNAL
"Home" or "Distant" Signal arms operated by levers at base. Very realistic model, standing 14 ins. in height.
Price **5/6**



SIGNAL CABIN No. 1
Dimensions: Height 6 ins. Width 4½ ins. Length 6 ins. Finished in colours ... Price **2/9**

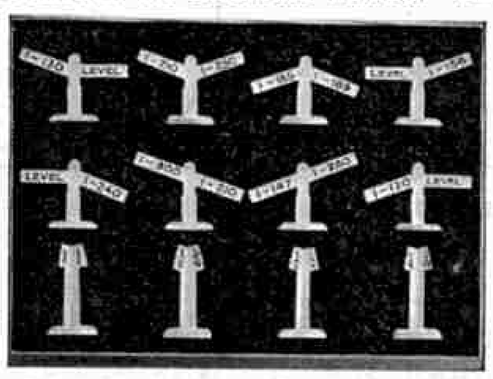


VIADUCT. Price **7/-** **Centre Section only.** Price **4/6**
ELECTRICAL VIADUCT. Price **8/-**
Centre Section for Electrical Viaduct. Price **5/-**

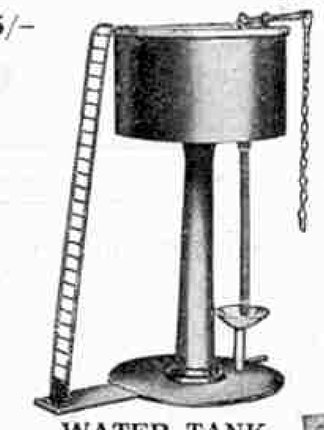


RAILWAY ACCESSORIES No. 8
Notice Boards.
Price, per set **2/3**

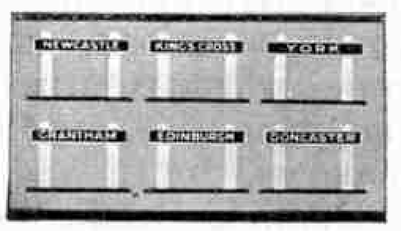
RAILWAY ACCESSORIES No. 7
Watchman's Hut, Brazier, Shovel and Poker ... Price **1/6**



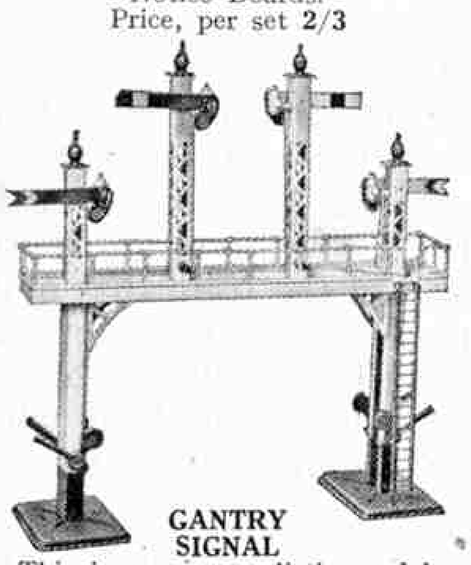
RAILWAY ACCESSORIES No. 5
Gradient Posts and Mile Posts. Price **2/-**



WATER TANK
Brightly coloured. Fitted with flexible tube and valve lever.
Price **6/6**

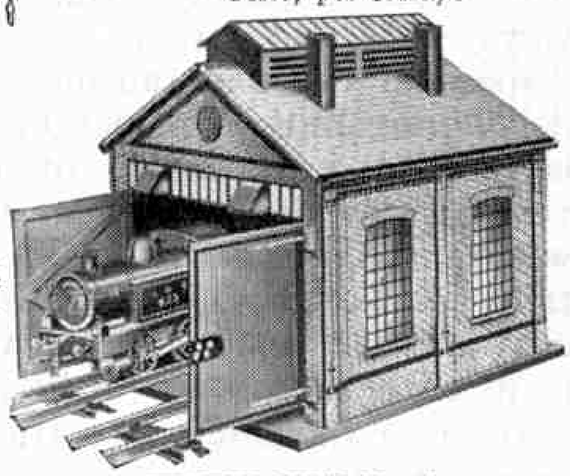


RAILWAY ACCESSORIES No. 9
Station Name Boards.
Price, per set **2/6**



GANTRY SIGNAL
This is a very realistic model, the signal arms of which are operated by levers at the base of the standards. Attractively finished in colours. Price **10/-**

RAILWAY STATION No. 2. Excellent model, beautifully designed and finished. Constructed in three sections, which are detachable. Dimensions: Length 2 ft. 9 ins., breadth 6 ins., height 7 ins. ... ... Price **10/-**



ENGINE SHED No. 1
This Shed is beautifully finished in realistic colours. It will accommodate Locomotives and Tenders of the M series, No. 0 and No. 1 types ... Price **11/-**

Hornby Locomotive Runs 22 Miles in Three Days

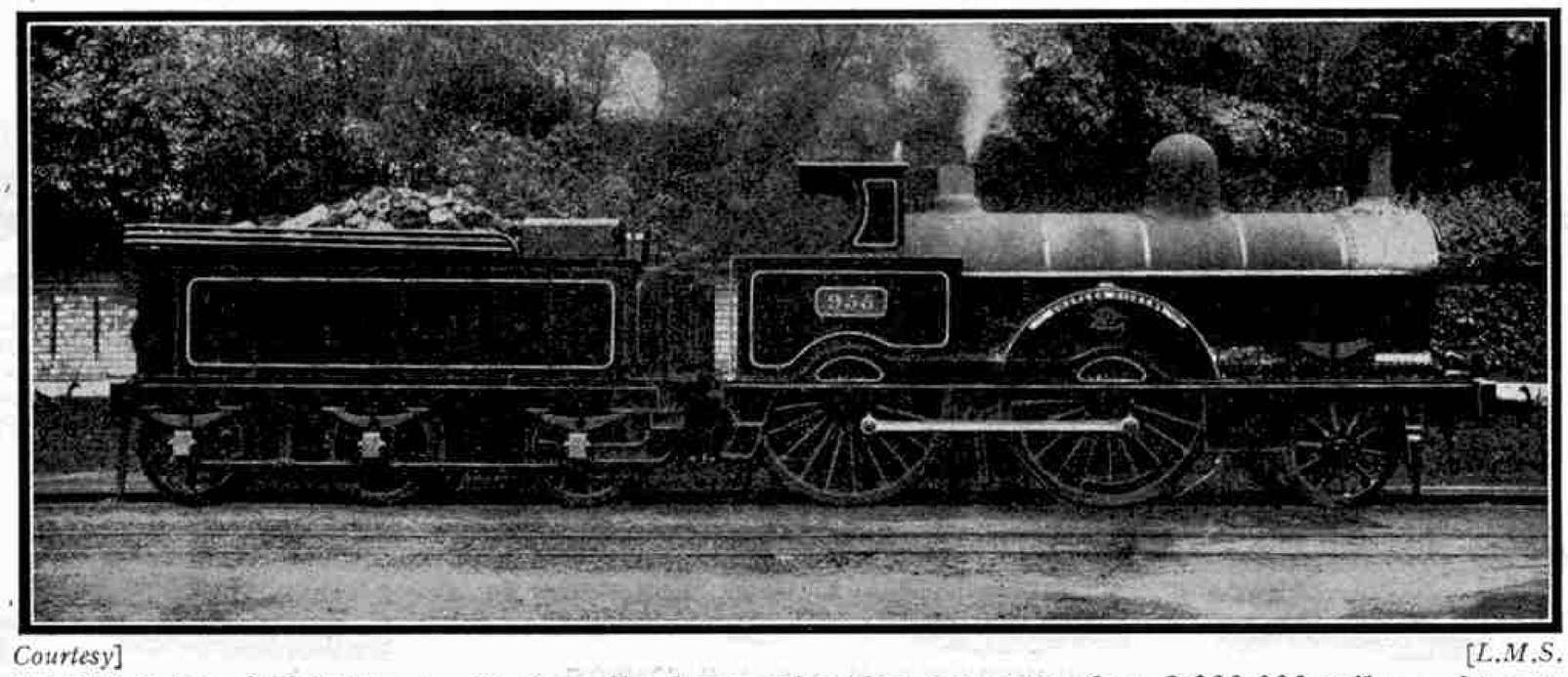
By "Tommy Dodd"

IN previous articles in this series I have described the Hornby locomotives of an entirely new range that were introduced last year. These are the No. 1 and No. 2 Special Locomotives. Both Tender Engines and Tanks of each type may be obtained, and there is no doubt that they will prove to be amongst the most popular features of the Hornby system. They are sturdily constructed and have an excellent turn of speed. The powerful springs of their clockwork mechanisms give them great length of run and also enable big loads to be hauled with ease.

Every locomotive in the range is a splendid example of excellent design carried out in the best quality of materials. Before leaving the factory each is carefully tested, in order to ensure that its performance is up to the desired standard.

In our Testing Department a very interesting experiment recently was carried out with a locomotive of the new range, that chosen for the purpose being a No. 1 Special Tender Locomotive. An engine of this type was drawn from stock and was then run continuously for three days. The track on which this extended trial was carried out is an oval circuit measuring 14ft. 8 in., and on a single winding the locomotive travelled round this no fewer than ten times. The distance covered during the three days amounted to 39,111 yds., or practically 22 miles, and the clockwork mechanism was wound up 800 times. At the conclusion of the period the locomotive was partly dismantled in order that every part could be thoroughly examined, but in spite of the exhaustive nature of the tests no signs of wear could be detected, and the locomotive was still in perfect working order.

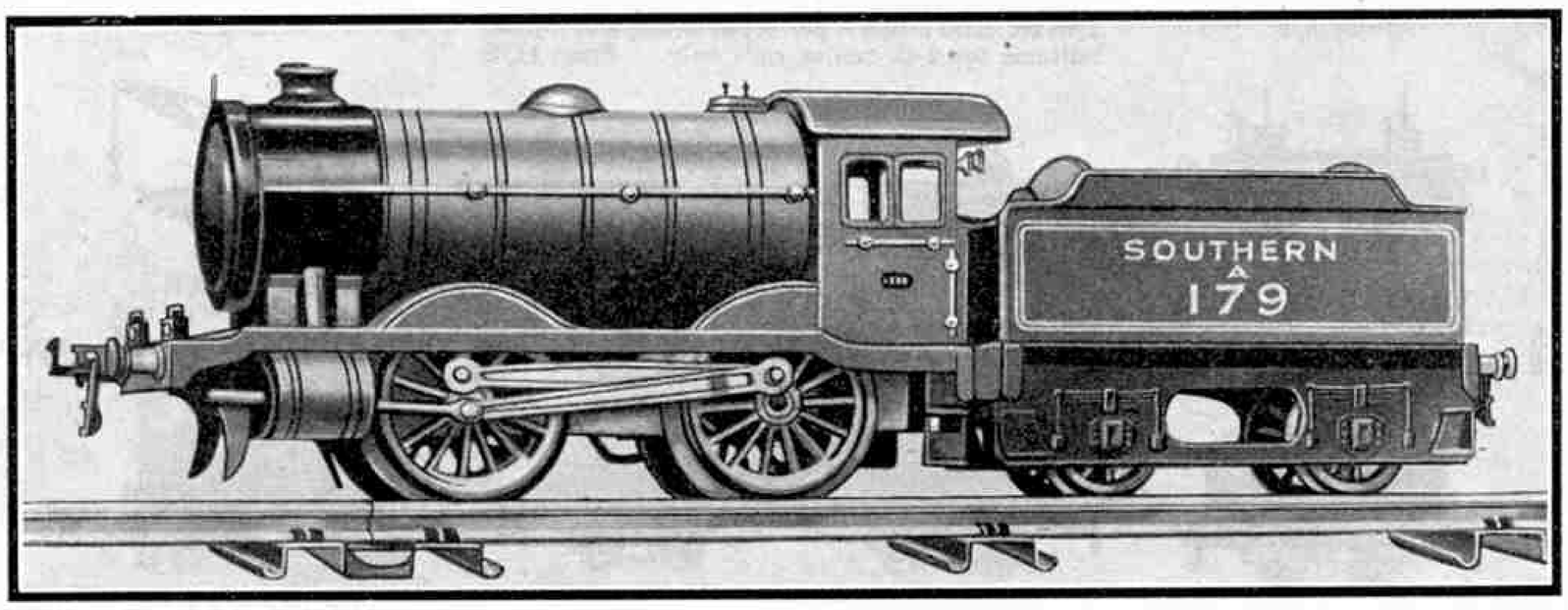
In order to make the test as realistic as possible the locomotive was not merely allowed to run round the track, but the direction in which it made the circuit was changed by means of a reverse rail six times during each winding. In addition, the brake was applied once during the same period. This means that the engine was brought to a standstill by means of its own brake 800 times and the mechanism was reversed on 4,800 occasions! This is drastic treatment, for reversing the gear of any clockwork engine in this manner is liable to put undue strain on the reversing movement, and tends to loosen the bearings and wear the teeth of the gear wheels. So sturdy is the mechanism of the Hornby No. 1 Special Locomotive, however, that this treatment had no apparent effect on the condition of the locomotive.



Courtesy] [L.M.S.

L.N.W.R. No. 955 "*Charles Dickens*," a locomotive that ran more than 2,000,000 miles. At one time "*Charles Dickens*" probably was the best known locomotive in Great Britain, and she created a record for length of main line service.

The mechanism tested in this manner is fitted to the No. 1 Special Tender Locomotive, and also to the No. 1 Special Tank Locomotive. The former is modern in design, for it has the large boiler that distinguishes the latest types of locomotives and consequently the boiler mountings are of reduced size. A very handsome and well-appointed cab is fitted, and the tender also is noteworthy, for it is correctly fitted with tanks and division plates for enclosing the coal spaces.



The Hornby No. 1 Special Tender Locomotive. An engine of this type ran 22 miles in 3 days without showing signs of wear.

The No. 1 Special Tank Locomotive is built on similar modern lines and is ideal for shunting.

Reports from various quarters of the amazing length of service that has been obtained from Hornby locomotives are continually being received. Those of the new range seem destined to create even more extraordinary records, and in respect of length of service they appear likely to earn a reputation similar to that of "*Charles Dickens*," the famous L.N.W.R. locomotive that ran more than 2,000,000 miles.

HORNBY SERIES

HORNBY ROLLING STOCK

GAUGE 0

Hornby Rolling Stock includes almost every type in use on the big railways, and a selection of the splendid range available is illustrated on this page. The various items are modelled on realistic lines and are beautifully enamelled, mostly in the correct colours of the L.N.E., L.M.S., G.W. or Southern Railways.

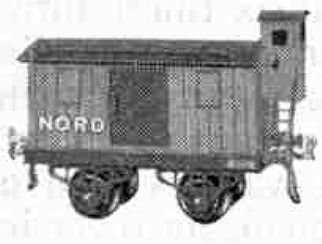
Ask your dealer to show you the full range of Hornby Rolling Stock.

PETROL TANK WAGON "PRATTS"
Finished in green.
Price **2/6**

MOTOR SPIRIT TANK WAGON "B.P."
Finished in yellow.
Price **2/6**

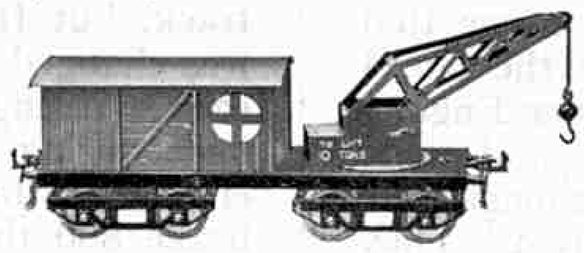
PETROL TANK WAGON "SHELL"
Finished in red.
Price **2/6**

PETROL TANK WAGON "REDLINE"
Finished in blue and red.
Price **2/6**

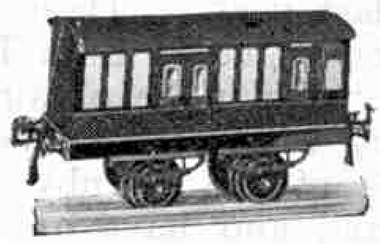


BRAKE VAN (French Type)
Lettered "Nord." Beautifully finished in colours. Opening doors. Price **4/-**

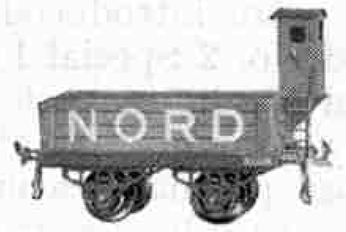
***HORNBY No. 1 PASSENGER COACH**
Realistic in design and fitted each side with opening doors. Price **2/6**



***BREAKDOWN VAN AND CRANE**
Beautifully coloured in brown and blue, with opening doors. Suitable for 2-ft. radius rails only. Price **6/3**



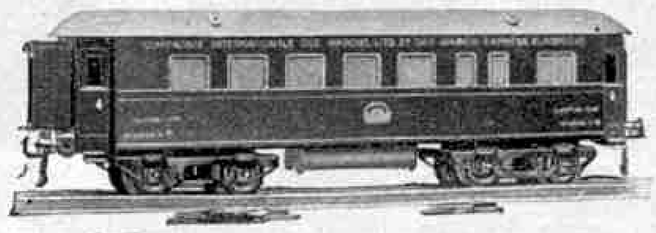
***GUARD'S VAN**
Realistic design, fitted each side with opening doors. Price **2/6**



WAGON (French Type)
Lettered "Nord." Highly finished in colours. Price **3/3**

BITUMEN TANK WAGON "COLAS"
Finished in blue.
Price **5/-**

ROTARY TIPPING WAGON
Finished in orange. Price **3/-**

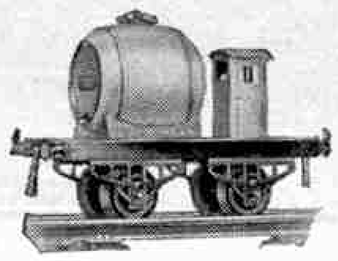


RIVIERA "BLUE" TRAIN COACH
"Dining" or "Sleeping."
This is a beautiful model, substantially built and well finished. Suitable for 2-ft. radius rails only.
Price **12/6**

***GAS CYLINDER WAGON**
Finished in red, lettered gold. Price **2/6**

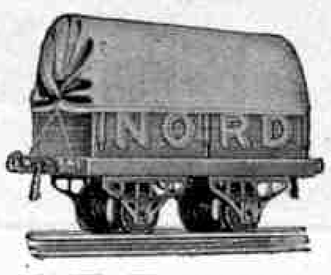
MILK TANK WAGON "UNITED DAIRIES"
A very realistic model, finished in blue and white. Price **5/6**

SIDE TIPPING WAGON
Excellent design and finish. Lettered "Robert Hudson Ltd.," or "Sir Robert McAlpine and Sons." Price **2/6**

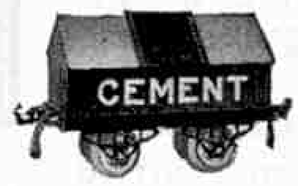


SINGLE WINE WAGON
An interesting model of the single-barrel type of wine wagon used in France. Finished in red and green. Price **3/9**

HORNBY PULLMAN COACH COMPOSITE Nos. 2-3
As supplied with Nos. 2 and 3 Pullman Train Sets. One part is designed for passenger accommodation and the other for conveyance of luggage. Suitable for 2-ft. radius rails only.
Price **11/6**

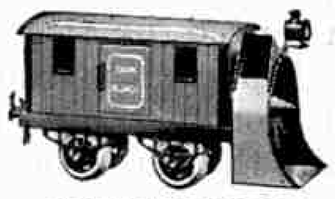


COVERED WAGON (French Type)
This new wagon is fitted with frame and sheet. French type, lettered "Nord." Price **2/6**



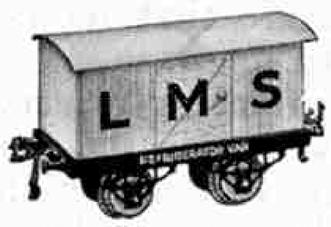
***CEMENT WAGON**
Finished in red.
Price **3/-**

***TIMBER WAGON No. 1**
Beautifully enamelled in green and red. Price **1/9**

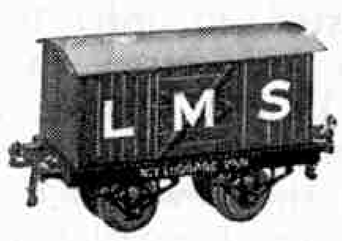


***SNOW PLOUGH**
With revolving plough driven from front axle.
Price **5/6**

HORNBY PULLMAN COACH Nos. 2-3
As supplied with Nos. 2 and 3 Pullman Train Sets. This splendid coach is perfect in detail and finish. Suitable for 2-ft. radius rails only. Price **11/6**

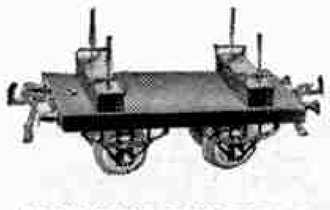


***REFRIGERATOR VAN**
Beautifully enamelled. Fitted with opening doors.
Price **3/9**

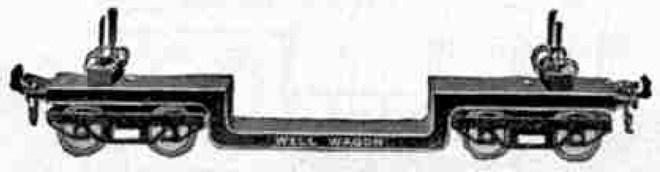


***LUGGAGE VAN No. 1**
With opening doors.
Price **3/6**

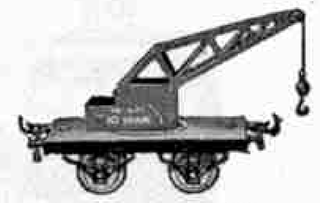
***GUNPOWDER VAN**
[Finished in red, with opening doors. Price **3/9**



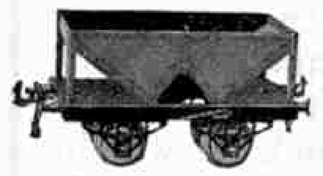
***LUMBER WAGON No. 1**
Fitted with bolsters and stanchions for log transport. Price **2/-**



***TROLLEY WAGON**
Finished in brown and blue. Suitable for 2-ft. radius rails only. Price **5/6**

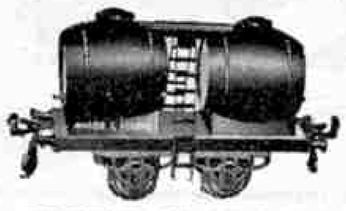


***CRANE TRUCK**
Finished in brown and blue. Price **3/6**



***HOPPER WAGON**
Mechanically unloaded. Finished in green Price **4/-**

***MILK TRAFFIC VAN**
Fitted with sliding door, complete with milk cans.
Price **3/6**

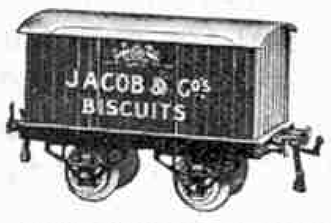


DOUBLE WINE WAGON
An attractive model, artistically enamelled in red and green. Price **3/9**

***TIMBER WAGON No. 2**
Beautifully enamelled in green and red. Suitable for 2-ft. radius rails only. Price **3/6**

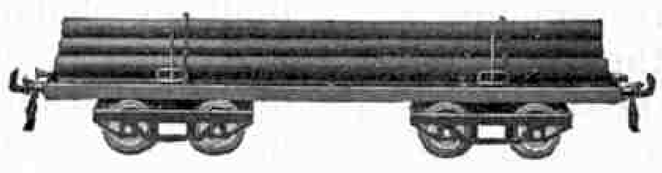
BRAKE VAN
Finished in brown, with opening doors. Obtainable in N.E. or S.R. lettering. Price **3/6**

BRAKE VAN
Finished in Grey, with opening doors. Obtainable with L.M.S. or G.W. lettering. Price **3/6**



JACOB'S BISCUIT VAN
Finished in crimson lake, with opening doors.
Price **3/6**

CARR'S BISCUIT VAN
Finished in blue, with opening doors.
Price **3/6**



***LUMBER WAGON No. 2**
Fitted with bolsters and stanchions for log transport. Suitable for 2-ft. radius rails only.
Price **4/-**

**Lettered L.M.S., L.N.E.R., G.W., or S.R.*

CRAWFORD'S BISCUIT VAN
Finished in red, with opening doors. Price **3/6**

SECCOTINE VAN
Beautifully finished in blue, with opening doors.
Price **3/6**

Manufactured by MECCANO LIMITED, BINNS ROAD, OLD SWAN, LIVERPOOL

Suggested Hornby Train Improvements

ELECTRICAL DOUBLE TRACK.—You will be pleased to learn that double track fitted with electric third rail is now available. This will enable you to arrange the curves on up and down lines symmetrically. The straight rails are 8/6 per half dozen and the curved are 9/- per half dozen. We do not yet make an electric crossover or level crossing, but we hope to introduce these as soon as an opportunity arises. (*Reply to P. Morris, York, and J. Soutar, Carlisle*).

SEPARATE NOTICE BOARDS.—In response to many requests, we have decided to list separately the components of our Railway Accessories Sets Nos. 8 and 9. The station name-boards are 5d. each, while the notice boards are 4½d. (*Reply to R. Bowen, Halifax*).

GANGWAY FOR CATTLE TRUCK.—Your suggestion to make cattle trucks fitted with doors that drop to form gangways will be given serious consideration when we design next season's rolling stock. We quite agree that they would be more in accordance with railway practice. (*Reply to T Benson, Halifax*).

STEAM RAIL COACH.—The suggestion that we should make a model of a "Sentinel-Cammell" steam rail coach has been made by several correspondents, and we shall keep the idea in mind. (*Reply to H. Phillips, Manchester*).

ENGINE SHEDS.—We suggest that you obtain Hornby Engine Shed No. 2 (price 17/6) for your model railway. This is much larger than the model to which you refer and will accommodate any Hornby locomotive. (*Reply to R. Stewart, Wigan*).

NEW TURNTABLE.—A scale model turntable such as you describe would certainly be an interesting addition to the Hornby Series, but on the average gauge "0" layout it would be difficult to incorporate the deep well that accommodates the revolving platform. (*Reply to A. Lewis, Nottingham*).

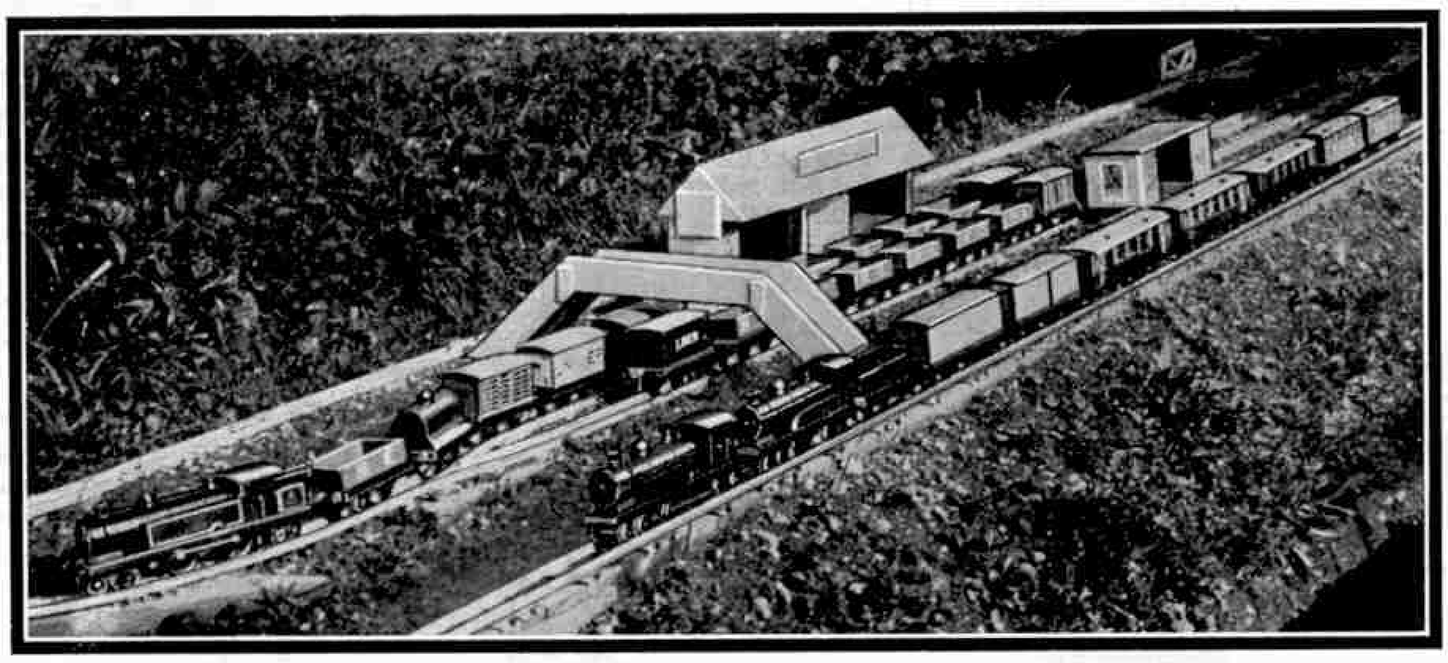
MAGNETIC SHUNTER'S POLE.—We have carried out experiments with a magnetised shunter's pole and find that the coupling and uncoupling of the wagons is only facilitated to a very slight degree. (*Reply to B. Walker, Derby*).

SPOKED WHEELS FITTED TO ROLLING STOCK.—The fitting of heavy spoked wheels to our goods rolling stock would add to their cost. Such wheels may be obtained separately from any Hornby agent and are easily fitted. The axles are 3d. per dozen, and wheels 2d. each, thus making them 8½d. for four wheels and two axles. (*Reply to D. Polesworth, Warrington*).

MINIATURE STATION STAFF.—At present we do not manufacture miniature railway officials and passengers for station use. We have this matter under consideration, however, and we may introduce sets of this nature at a later period. We agree that they add "life" to a platform. (*Reply to E. Jones, St. Helens*).

REDUCTION IN SIZE OF COUPLING.—On our new rolling stock the size of the coupling has been considerably reduced. This change will meet your objections. (*Reply to E. Burton, Dover*).

THREE-QUARTER RAIL.—The introduction of a three-quarter rail has been suggested on previous occasions, but we fail to see what particular advantage such a rail would offer over a combination of a half rail and a quarter rail. (*Reply to E. M. Jones, Wallasey*).



Terminal station on the interesting layout of the Nelson (New Zealand) Branch, No. 60, of the Hornby Railway Company: Chairman, Mr. G. L. Housiaux; Secretary, F. Curran. Each of the 37 members of the Branch undertakes to keep a measured length of this extensive outdoor track in good order.

SPECIAL HORNBY-MECCANO RAIL CONNECTIONS.—Your sketch showing a section of standard rail with holes pierced at one end for attachment to Meccano rails is interesting. We agree that it would be possible to connect Hornby Rails with those made from standard Meccano parts by this means, but rails made from Meccano are not used to an extent that would warrant the introduction of the suggested adapter. (*Reply to D. E. Ross, Middlesbrough*).

METROPOLITAN LOCOMOTIVE.—As pointed out in these pages many times previously, the advantages to be gained by converting the wheel arrangement of our present Metropolitan locomotive do not at present warrant our undertaking such a costly alteration. (*Reply to E. Dixon, Canada*).

LIGHTER LOCOMOTIVES.—No advantage would be gained by reducing the weights of Hornby locomotives, and, in fact, the new types have been made heavier than those formerly produced in order to enable maximum efficiency to be obtained from their motors. (*Reply to T. F. Rose, Cardiff*).

MODEL FLOWER BEDS.—We do not think that model flower beds are suitable for introduction into the Hornby Train series. Such scenic details can be manufactured at home very easily if they are required. (*Reply to P. Wallace, Bristol*).

ELECTRIC LIGHTING IN MODEL COACHES.—Your suggested scheme for fitting electric lights to Hornby No. 2 Pullman coaches is certainly very ingenious and interesting, but we are afraid that it would add greatly to their cost. (*Reply to P. Waugh, London*).

4-6-2 TANK ENGINE.—The introduction of a tank engine similar to that you suggest would entail the use of a six-coupled mechanism. At present we do not intend to introduce such a mechanism, although we may do so at a later date. (*Reply to J. F. Taylor, Preston*).

SIX-WHEELED COACHES.—We do not consider that it would be advisable to introduce model six-wheeled passenger coaches, as these are rapidly being replaced on actual railways by bogie coaches of more modern design. (*Reply to W. Grace, Scotland*).

DESTINATION BOARD.—We agree that the realistic effect of a train of Hornby Pullman Cars would be increased by the addition of destination boards. A large number of Hornby Railway enthusiasts have made similar suggestions, and we have filed the idea for further consideration. (*Reply to P. Barrington, Leeds*).

MINIATURE WEIGHBRIDGE.—We do not think a miniature weighbridge could be introduced successfully into a Hornby Railway layout. It could serve no useful purpose, and a realistic model would be very costly to produce. (*Reply to C. Owen, Hastings*).

TRAINS IN PRE-GROUPING COLOURS.—Several readers have suggested that we should introduce trains in the colours of the various railway companies before grouping came into being. We do not think that such an innovation would be at all popular, and we are afraid we cannot consider it. (*Reply to G. Beckett, Nottingham*).

MINIATURE CATTLE FOR CATTLE TRUCKS.—We have had no demand at all for miniature cattle for this purpose. Sets of miniature cattle can be obtained at most high-class toy shops, but we doubt whether they would be very satisfactory for your purpose. (*Reply to J. Taylor, Barnsley*).

LARGER SIGNAL GANTRY.—We note your suggestion that a larger signal gantry should be introduced, having double arm signals and six posts. We are doubtful if such an improvement would be popular, for only on very large layouts could such a gantry be incorporated correctly. The suggestion is interesting, however, and will be kept before us for future reference. (*Reply to T. Edgar, London*).

CLOCKWORK CRANE.—We are unable to consider the introduction of this type of crane at the moment. We think that your purpose could be effected by means of the ordinary platform crane. (*Reply to A. J. Bernard, Carlisle*).

MODEL CATTLE DOCK.—At present we do not manufacture a miniature cattle dock, but it is possible that later we shall consider the introduction of one. (*Reply to R. Webster, Portsmouth*).

LARGER RADIUS CURVES.—Double track curves, which include rails of 2 ft. and 2 ft. 3¾ in. radius, will enable you to build up a perfectly symmetrical parallel track. (*Reply to E. L. Baker, Bedford*).

NEW 2 FT. CROSSOVER.—Your crossover will not fit the double track because it is of the old design. A new type of crossover has been produced for use in conjunction with the new double track, and of course, this also will fit the parallel points. A revised design of level crossing for use with the parallel points and double track also is available. (*Reply to J. C. Martland, Coventry*).

FRUIT VANS.—We agree with you that the introduction of fruit vans should prove very popular. Your suggestion will be considered when making additions to our present range of rolling stock. (*Reply to J. E. Moyles, Bootle*).

POINTS FOR DOUBLE TRACK.—A similar suggestion has been made previously, but we have not yet come to a decision regarding this type of point. When the question is decided an announcement will be made in the "*M.M.*" (*Reply to R. Bondman, Surrey*).

RECTANGULAR TAR WAGON.—We will consider your suggestion that a rectangular tar wagon should be introduced. The most recent introductions of this type—the "Colas" Bitumen Tank Wagon and the United Dairies glass-lined Milk Tank Wagon—have proved very popular. (*Reply to T. D. Smith, Darlington*).

Rails, Points and Crossings

Hornby Series

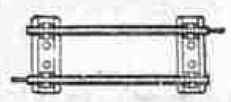
Alternate Pegs

Gauge 0, 1¼″

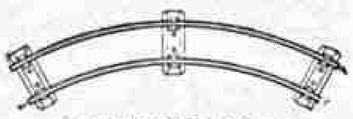
HORNBY Rails, Points and Crossings are built for hard wear and smooth running. They are made of the finest materials and hold together rigidly and strongly, for real workmanship is put into them. Note the great superiority, both in quality and appearance, of the Hornby Rails.

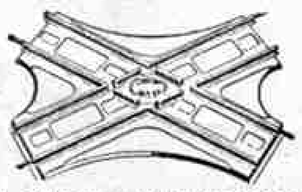
A1½ CURVED HALF RAIL

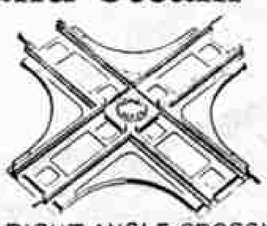
Rails for Clockwork and Steam Trains

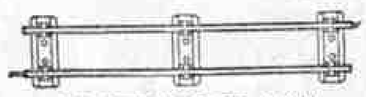

B½ STRAIGHT HALF RAIL

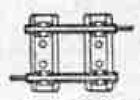
A1¼ CURVED QUARTER RAIL

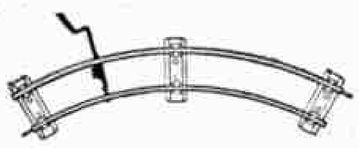

A1 CURVED RAIL

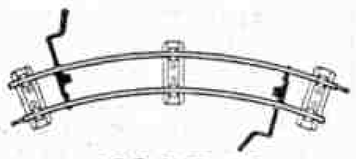

CA1 ACUTE-ANGLE CROSSING


CR1 RIGHT-ANGLE CROSSING


B1 STRAIGHT RAIL


B¼ STRAIGHT QUARTER RAIL


AB1 CURVED BRAKE RAIL


AB2 CURVED BRAKE RAIL

CURVED RAILS

A1	Curved rails (1-ft. radius)	...	doz.	4/6
A1½	Curved half rails	...	„	3/6
A1¼	Curved quarter rails	...	„	3/–
AB1	Curved brake rails	...	each	6d.
A2	Curved rails (2-ft. radius)	...	doz.	4/6
A2½	Curved half rails	...	„	3/6
A2¼	Curved quarter rails	...	„	3/–
AB2	Curved brake rails	...	each	6d.
DC2	Curved rails, double track, 2-ft. radius		½ doz.	5/–

RAIL CONNECTING PLATES

RCP	Rail connecting plates	...	½ doz.	4d.

CROSSINGS

CA1	Acute-angle crossings (for 1-ft. radius tracks)	each	1/6
CA2	Acute-angle crossings (for 2-ft. radius tracks)	„	1/6
CR1	Right-angle crossings (for 1-ft. radius tracks)	„	1/6
CR2	Right-angle crossings (for 2-ft. radius tracks)	„	1/6

POINTS

For 1-ft. radius curves

PR1	Points, right-hand	pair	4/–
PL1	Points, left-hand		

For 2-ft. radius curves

PR2	Points, right-hand	pair	4/–
PL2	Points, left-hand		
PSR2	Points, on solid base, with ground disc and lamp, right-hand	pair	7/6
PSL2	Do., do., left-hand		

DOUBLE SYMMETRICAL POINTS

For 1-ft. radius curves

DSR1	Double symmetrical points, right	pair	5/–
DSL1	Do., do., left		

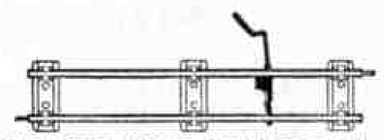
For 2-ft. radius curves

DSR2	Double symmetrical points, right	pair	5/–
DSL2	Do., do., left		

PARALLEL POINTS

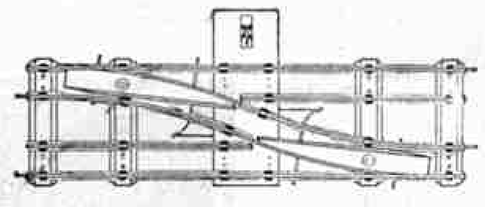
For 2-ft. radius curves

PPR2	Parallel points, right	pair	5/–
PPL2	Parallel points, left		


BB1 STRAIGHT BRAKE RAIL

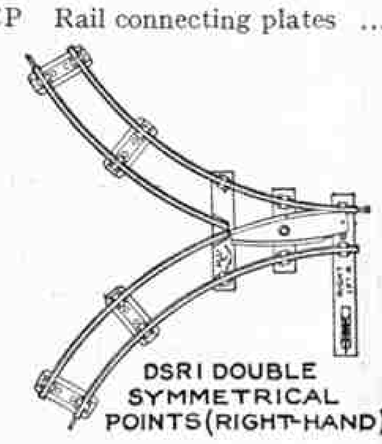
STRAIGHT RAILS

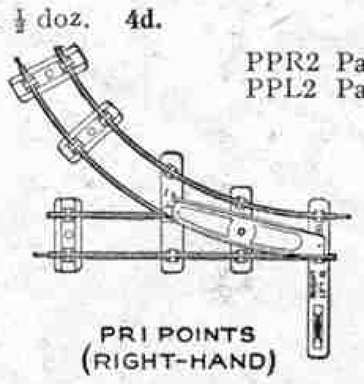
B1	Straight rails	...	doz.	4/–
B½	Straight half rails	...	„	3/–
B¼	Straight quarter rails	...	„	2/6
BB1	Straight brake rails	...	each	5d.
BBR	Straight brake and reverse rails		„	1/6
DS1	Straight rails, double track	...	½ doz.	4/6

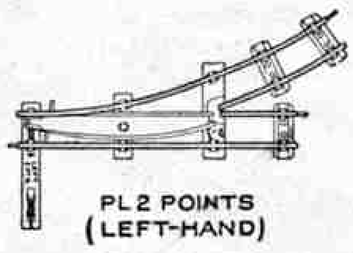

COR2 CROSSOVER

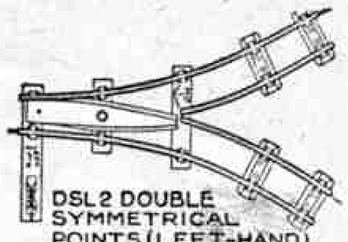
CROSSOVERS

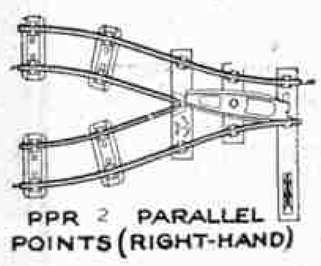
COR2	Crossovers, right hand	per pair	12/–
COL2	Crossovers, left hand		


DSR1 DOUBLE SYMMETRICAL POINTS (RIGHT-HAND)

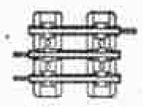

PR1 POINTS (RIGHT-HAND)

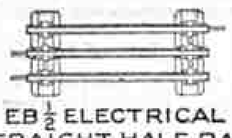

PL2 POINTS (LEFT-HAND)

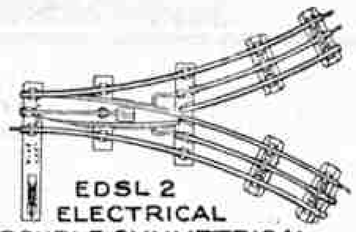

DSL2 DOUBLE SYMMETRICAL POINTS (LEFT-HAND)

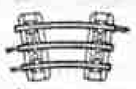

PPR 2 PARALLEL POINTS (RIGHT-HAND)

Rails for Electric Trains, Gauge 0, 1¼″

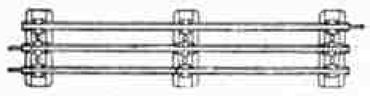

EB¼ ELECTRICAL STRAIGHT QUARTER RAIL


EB½ ELECTRICAL STRAIGHT HALF RAIL


EDSL 2 ELECTRICAL DOUBLE SYMMETRICAL POINTS (LEFT-HAND)

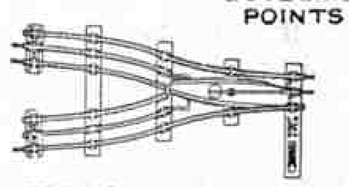

EAI¼ ELECTRICAL CURVED QUARTER RAIL

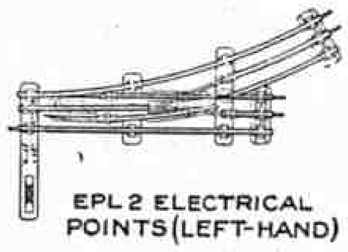
EAI½ ELECTRICAL CURVED HALF RAIL


EB1 ELECTRICAL STRAIGHT RAIL

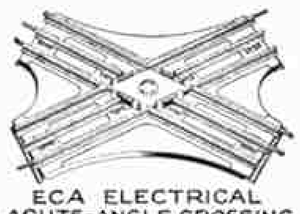
STRAIGHT RAILS

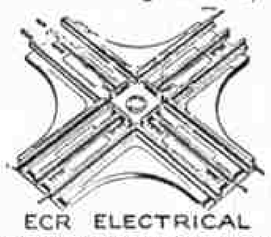
EB1	Straight rails	...	doz.	7/–
EB½	Straight half rails	...	„	4/6
EB¼	Straight quarter rails	...	„	4/–
EDS1	Straight rail, double track	...	½ doz.	8/6


EPPR2 ELECTRICAL PARALLEL POINTS (RIGHT-HAND)


EPL2 ELECTRICAL POINTS (LEFT-HAND)

EA1 ELECTRICAL CURVED RAIL


ECA ELECTRICAL ACUTE-ANGLE CROSSING


ECR ELECTRICAL RIGHT-ANGLE CROSSING

CROSSINGS

ECA	Acute-angle crossings	...	each	4/–
ECR	Right-angle crossings	...	„	4/–

POINTS

For 2-ft. radius curves

EPR2	Points, right-hand	pair	10/–
EPL2	Points, left-hand		

DOUBLE SYMMETRICAL POINTS

For 2-ft. radius curves

EDSR2	Double symmetrical points, right	pair	12/–
EDSL2	Do., do., left		

PARALLEL POINTS

EPPR2	Parallel points, right	pair	12/–
EPPL2	Parallel points, left		

CURVED RAILS

EA1	Curved rails (1-ft. radius)	...	doz.	8/–
EA1½	Curved half rails	...	„	5/–
EA1¼	Curved quarter rails	...	„	4/6
EDC2	Curved rails, double track	...	½ doz.	9/–
EA2	Curved rails (2-ft. radius)	...	doz.	8/–
EA2½	Curved half rails	...	„	5/–
EA2¼	Curved quarter rails	...	„	4/6

Electrical Points, Double Symmetrical Points, Parallel Points and Crossings for 1-ft. radius curves are not supplied.

TCPL Terminal Connecting Plates (low voltage) ... each 1/6

Manufactured by MECCANO LIMITED, OLD SWAN, LIVERPOOL

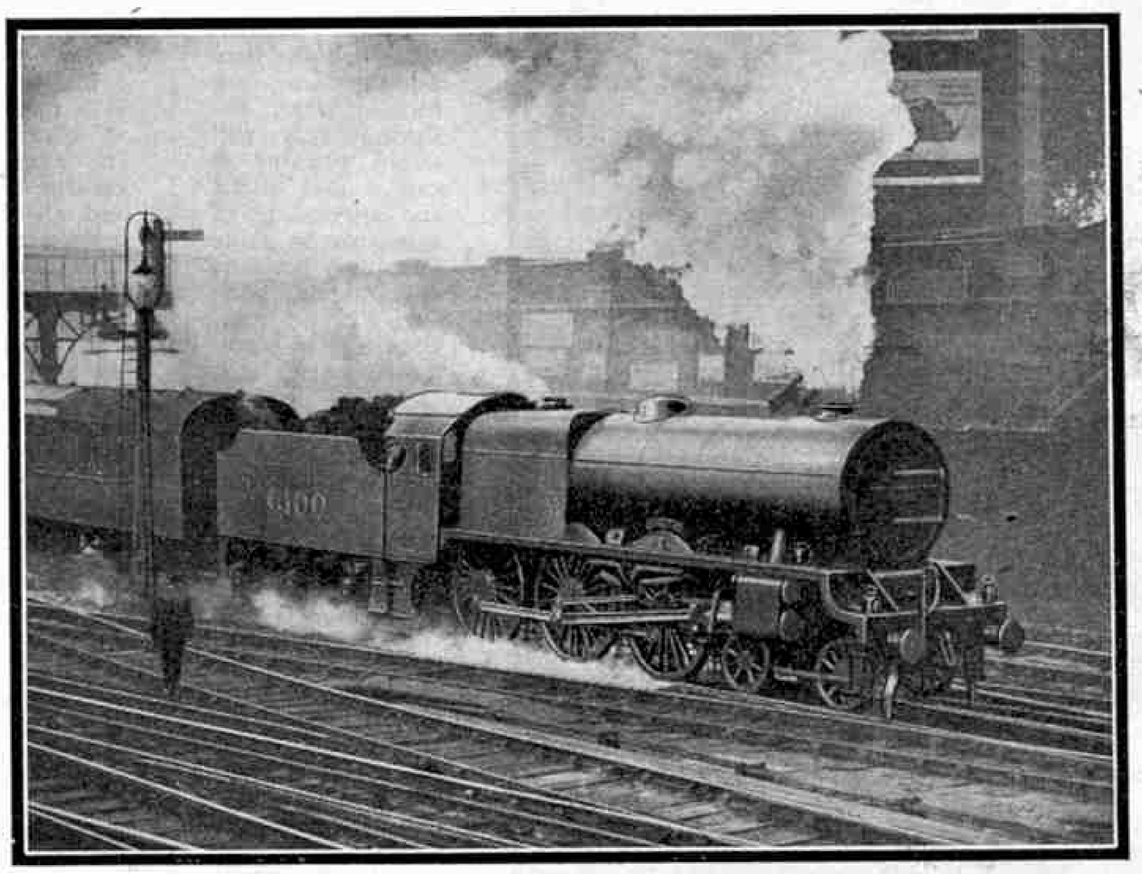
H.R.C. COMPETITION PAGE

Competitions appearing on this page are open only to members of the Hornby Railway Company. Envelopes containing entries, should have the title of the competition clearly written in the top left-hand corner and should be addressed to the Hornby Railway Company, Binns Road, Old Swan, Liverpool. The name, address and membership number of each competitor should appear in clear writing on every sheet of paper used.

An Impossible Train!

A SHORT time ago an article was submitted to us for publication by a writer who, in an accompanying letter, alleged that it described a wonderful run that he had made from London to Crewe. Knowing that members of the H.R.C. are always interested in railway performances of merit we began to read the article with great hopes that something good was contained in it. In the first few lines we noticed several errors, and when we reached the end of the first paragraph we decided that it was quite hopeless!

We were about to consign the article to the waste paper basket when it occurred to us that H.R.C. members would enjoy tracking down the numerous mistakes contained in it. We reproduce it on this page, therefore, together with the illustration sent in by our ill-informed contributor, and invite readers to make a list containing as many errors as they can find.



Starting out from Marylebone with the famous "Pacific" locomotive "*Royal Welsh Fusilier*" at the head of the train!

"On our wonderful run to Crewe we left Marylebone at 9.50 a.m. in the famous "*Royal Scotsman.*" The train was composed of the usual Pullman coaches, which were painted the bright green characteristic of the rolling stock of this Company, and its weight provided a tough haulage proposition, even for the three-cylinder compound 4-6-2 No. 6099 "*Royal Welsh Fusilier*" at its head.

"The weather conditions were bad and the damp mist made the rails slippery. Fortunately the start from this terminus is quite easy for locomotives drawing heavy trains and the start was made in excellent style. We soon reached Camden Engine Sheds, where many examples of modern locomotives were to be seen. As we rushed by I was fortunate enough to obtain a glimpse of two engines of the "Flying Scotchman" class. These were No. 6118, "*Fury*" and No. 6123, "*London Irish Rifleman.*" Equally interesting engines also visible were No. 6118 of the 4–8–2 "Consolidation" class and "*King Edward VIII,*" one of the famous "Admiral" class of the Great Southern Railway.

"Beyond the sheds a good view was obtained of the extensive marshalling yard. This is laid out for "hump-shunting." It is equipped with wagon "retarders," and it was very interesting to see shunters armed with their poles, running alongside wagons descending the hump.

"Leaving Camden behind we began to climb the long bank to the summit at Potter's Bar, a heavy grind up an incline of 1 in 75. Shortly before reaching the top of the rise we passed over the first set of water troughs, from which we replenished the supply in our tanks. Once over the top and on our way to Bletchley our speed rapidly increased, reaching a maximum of 70 m.p.h. near Wolverton. The locomotive ran in fine style, and the 83¼ miles from Waterloo were covered in schedule time.

"Along the Trent Valley line we ran smartly past Stechford and Bushbury Junction, stopping at the latter station in order to exchange mails and to slip the coach for Skegness. We next passed Stafford, reducing speed on account of the curve, after which we accelerated, passing Whitmore, 14 miles from Stafford in 18 minutes. Three miles at 1 in 177 down Madeley Bank followed, and near Norton Bridge our speed rose to 65 m.p.h.

"After passing Norton Bridge our driver eased down considerably. We ran smartly over the giant cantilevers of the bridge that crosses both canal and river to connect Widnes and Runcorn, obtaining wonderful glimpses of the rocky coast as we did so, and at last rattled over the multitude of junctions and crossings that herald the approach to Crewe. We passed the extensive railway works at nearly 60 m.p.h., and finally, with a gradual application of the Westinghouse brake we came to a smart stop exactly at booked time.

"This ended a most enjoyable journey. I walked to the head of the train in order to discuss the run with the driver, who agreed with me that the loss of time was due to bad weather conditions."

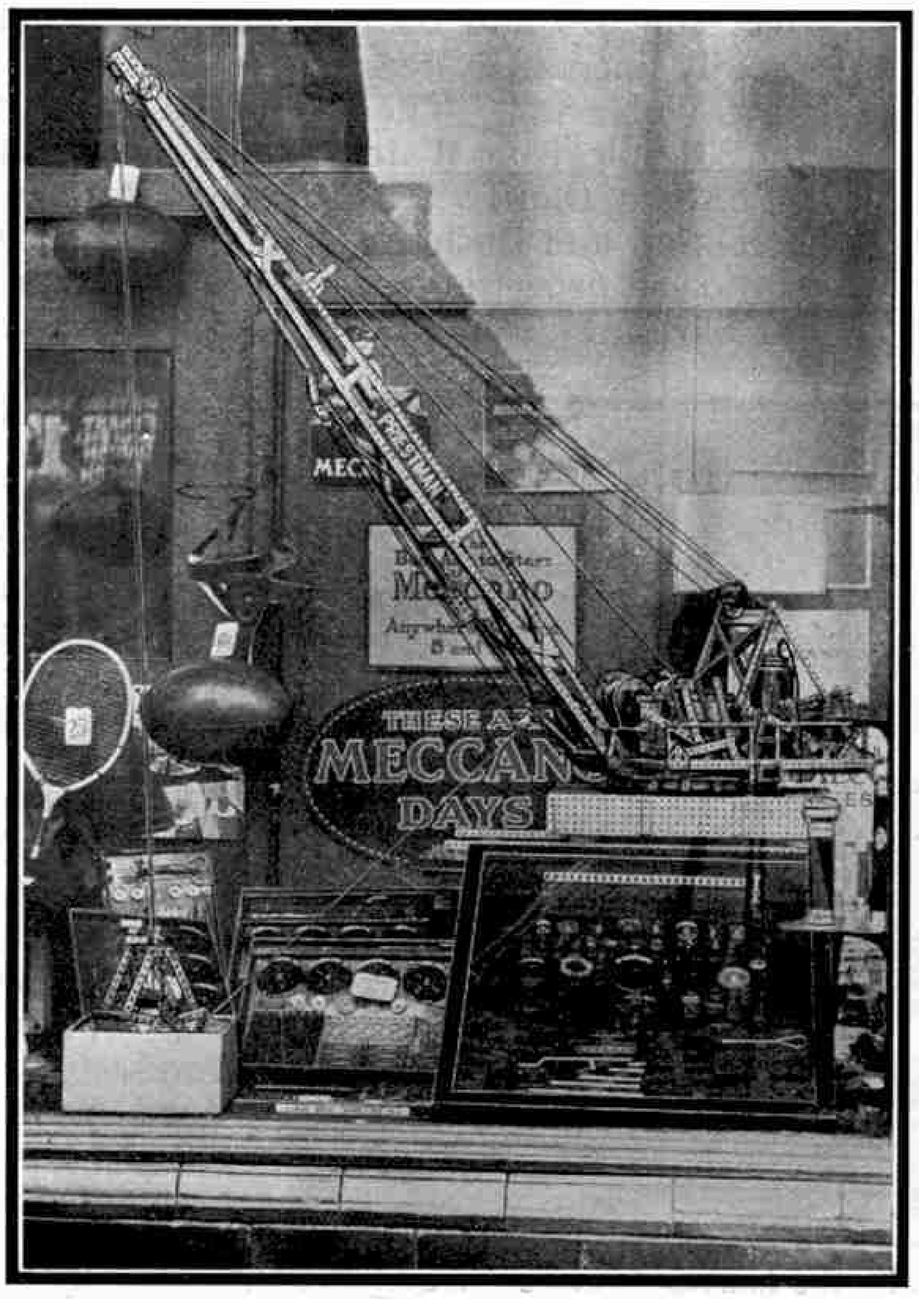
We feel sure that readers will agree that here is a wonderful opportunity for finding mistakes! Each competitor should make a complete list of these in the order in which they occur, and when he thinks that every error has been accounted for, he should write his name, address and membership number on the sheet and forward it to Headquarters. The envelope containing the entry should be clearly marked "Impossible Train Contest" in the top left-hand corner.

The competition will be divided into two sections—Home and Overseas. Prizes of Hornby Goods (or Meccano if preferred) to the value of £1-1s., 15/–, 10/6, and 5/– respectively, will be awarded to the four competitors in each section who submit the most complete lists. In addition, a number of consolation prizes will be awarded to the best of the remaining entries.

In the event of a tie for any prize neatness will be taken into consideration in making a final decision. The closing dates for the Competition are 31st January, 1930, for the Home section, and 30th April for entries from Overseas.

Meccano Model for a Museum

Our illustration shows a splendid model of a Priestman Dredging Crane on exhibition in the window of Mr. G. H. Crawford's Toy and Sports Depot in Holderness Road, Hull. The model was constructed by W. D. Priestman, Jnr., and secured one of the principal awards in Section A of the 1928-9 £100 Meccano Model-building Contest.



The model Priestman Dredging Crane (see Col. 1).

A further honour will shortly be gained by this excellent model, for the firm of Priestman Brothers Ltd., of Hull, have found that it so closely resembles a dredging crane manufactured by them, that arrangements are being made to place the model in the Hull Museum of Transport and Commerce as a permanent demonstration of the mechanical intricacies of this type of crane.

The model is driven from a twin cylinder steam engine and includes, among other distinguishing features, slipping friction and relay clutches on the two winding drums. The purpose of the former type of clutch is to take up any slack in the grab operating ropes, which, in an actual dredger, would be liable to cause damage.

When the grab is on the "spoil" the clutch of one of the drums is engaged and the grab is closed and raised. Next the brakes of both drums are applied and the crane is swivelled so that the grab is brought over the point where the spoil is to be deposited. Then the hoisting brake is released and the grab opens.

Ingenuity! Integrity?

The following letter was received recently by a firm in London from a correspondent in Japan. Whilst we do not recommend readers of the "*M.M.*" to follow the principles laid down in this letter, we think it is sufficiently amusing, and a good illustration of the ingenuity of the East, to warrant our printing it.

"Honoured Sirs: Regarding the matter of escaping penalty for non-delivery of the Drill Machine. There is a way to creep round same by diplomat. To attain this end it is requisite only that we make statement of strike occur during our Factory (of course big untrue).

Please address this firm on here accompanying form of letter, believing this will avoid penalty of case. But about the appending of signature to same I am very hesitant what to suggest to you. As Mr. Brown is most religious and also heavily upright and godly but otherwise competent man, it fears me that useless you to apply for his signature. Better send same to Yokohama Office making forge, but you no cause to fear of prison happening, as this forge business often operated by other merchants of highest integrity.

It is of highest misfortune in this present case that Mr. Brown so godlike, and excessive awkward for business purpose. I think very much desirable he add little serpentlike wisdom to upright manhood and thus found a goo l businessedifice."

Hobbies Catalogue for 1930

Hobbies catalogue for 1930, recently to hand, is a veritable encyclopædia for the handyman. The purely catalogue portion of the book is really amazing in the ground that it covers. The Editorial articles are of particular value and deal with a variety of subjects, ranging from how to start fretwork to gramophone making and wireless.

This splendid 272-page catalogue, together with two interesting fretwork designs, may be obtained for 9d. from any newsagent or Hobbies branch, or for 1/- post free, from Hobbies Ltd. (Dept. 96), Dereham, Norfolk.

OUR CRICKET BAT CONTEST

From the very many letters that have reached us during the past few days, following the publication in the December "*M.M.*" of the terms of the competition for the autographed cricket bat, it is clear that we count a considerable number of keen cricketers among our regular readers.

For the benefit of new readers we must explain that during their visit to Liverpool last summer to play the Lancashire County Cricket XI, the South African Cricket tourists visited the Meccano factory, and, at the request of the Editor, autographed a specially-chosen cricket bat for presentation as a prize in an "*M.M.*" contest. Subsequently the bat was autographed by the Lancashire XI, and also by Mr. Frank Hornby, inventor of Meccano and Managing Director of Meccano Limited.

Full details of the bat and the competition that is being held to decide which Meccano boy shall become the fortunate owner, were given on page 955 of the December "*M.M.*" There is still time to take part, for the closing date is not until 31st March. Competitors are not required to rely upon their own unaided efforts; they may enlist the help of parents, uncles, cousins and friends. We are looking forward to a bumper entry, and in the meantime the bat, together with a photograph of the South African team, taken on the occasion of their visit to the factory, will be on view in the windows of prominent Meccano dealers in various parts of the country.

During January 1930, the bat is on view as follows:—

7th to 11th Jan. ... ... Bunneys Ltd., Church Street, Liverpool.
14th to 18th Jan. ... ... R. Wylie Hill & Co. Ltd., 20, Buchanan Street, Glasgow.
21st to 25th Jan. ... ... Dixon's, 41, High Street, Dundee.
28th Jan. to 1st Feb. ... J. M. Piper, 118, Union Street, Aberdeen.

Jaeger Jerseys in Meccanoland

The Jaeger Company, makers of the well known Jaeger Meccano Jersey, are supplying the suits for the Meccanoland scene at the Drury Lane Pantomime. All Meccano Boys should get round the rich uncle to take them to the Pantomime in order to see this wonderful scene.

"Blue Train" Display in London

A very attractive window display in which Meccano boys and Hornby Train users of London and district will be specially interested may be seen at the premises of the International Sleeping Car Company, 20, St. James St., London, S.W.1. The central feature is a model railway on which runs a 6-volt No. 3E Hornby "Riviera Blue Train." This is a replica of the well-known train to the sunny south of France, the sleeping and dining cars on which are owned by the Company.

Tunnels, Bridges, and other accessories of the Hornby System make the surroundings of the track realistic as well as picturesque. The display will continue for about four weeks, and should be seen by all readers who live sufficiently near to pay a visit.

A Schoolboy's Diary

(Charles Letts & Co. 1/6 net)

Many schoolboys wish to keep a record of their daily life and those who decide to do so will find this diary excellent for the purpose. It is one of the series issued by the well-known firm of Charles Letts & Co.,and is quite up to the standard of its predecessors. It is more than a diary, for its pages contain a wealth of information of the type that is often required by the average boy, ranging from sports records and results to French and German verbs, and chemical and physical formulas. As usual, a very interesting feature of the diary is a section dealing with careers that gives valuable information in regard to the steps that should be followed in taking up a good profession.

Even the diary pages are not without interest, for in addition to reminders of various centenaries and other anniversaries this section of the booklet contains many excellent photographs of different phases of sport, these representing football, cricket and tennis scenes. The diary is published in a cloth cover at 1/6, and a leather-covered edition with pockets may be obtained at 3/-.

Apprenticeship Schemes of British Thomson-Houston Co. Ltd.

In the references to the apprenticeship schemes of the British Thomson-Houston Co. Ltd., Rugby, that were contained in our article on Electrical Engineering, in the series "What Shall I Be?" on page 918 of the December "*M.M.*," no mention was made of the cost of living bonus. The wages and special awards of apprentices of all classes as given in the article are exclusive of this allowance, which is 50 per cent. of the rate.

It should also be noted that those engaged by this firm are expected to attend the Rugby Technical College, and reports from the staff of this college are taken into account in awarding bonuses and increases in pay. In the case of student apprentices, the possession of a Degree or Diploma of a recognised University or College is essential, this being by far the best evidence that the student is sufficiently advanced to profit by the course of training given in the works at Rugby. Finally, intending applicants should note that the number of student apprentices is not limited, as stated in the article, but only a certain number of chemist apprentices may be taken.

A Useful Surveying Instrument

An interesting and simple form of a surveying instrument has been introduced by George Philip & Son Ltd., under the name of "*Philips' Handy Theodolite.*" This has been designed by Mr. J. C. Sherrin, the designer of an even simpler form of Pocket Surveyor that was referred to in the pages of the "*M.M.*" for January, 1929.

The present instrument carries a dial graduated in degrees and with it are supplied a ball-and-socket joint and screws to enable it to be fixed to the top of a staff. The instrument is moulded in ebonite composition and all metal parts are nickel plated.

Naturally the "Handy Theodolite" is not as accurate as an expensive scientific instrument, but it is sufficiently so for many practical purposes. An accompanying pamphlet explains the uses to which it may be put. These include measuring the heights of buildings or trees, laying out sports grounds, taking altitudes and measuring inaccessible distances. Meccano boys will find the instrument of great assistance in their hobby. Its cost is only 17/6, and it may be obtained from George Philip & Son Ltd., 32, Fleet Street, London, E.C.4, Postage 6d. extra.

MECCANO WRITING PADS

These Writing Pads are just the thing to use when writing to your friends, for the special notepaper shows at once that you are a Meccano boy.

The pads are supplied in two sizes, each consisting of 50 printed sheets of tinted bank paper with cover. Prices—Large, 1/- each (post free); Small, 6d. each (post free), from Meccano Ltd., Old Swan, Liverpool.

A World-Wide Fellowship of Boys

Why You Should Join the Meccano Guild

THE really happy boys throughout the world to-day are those who have a hobby in which they take an enthusiastic and lasting interest, and the happiest of all are Meccano boys, for their's is the greatest of all hobbies. When a boy takes up a hobby, whatever it may be, he feels a great desire to meet other boys having interests similar to his own, and to compare notes and talk things over with them. This is particularly the case with Meccano. No Meccano boy is content to "play a lone hand" for long. He very soon wants to meet other Meccano boys, to see their models and to show them his own, and to discuss plans and schemes for other and bigger models.

It is more than 20 years since Meccano began to take its place as the greatest of all hobbies, and even in those early days Meccano boys were forming themselves into little clubs and societies. Presently we at Meccano Headquarters began to receive letters asking us to set up some form of central organisation to which all the individual clubs and societies might look for guidance and which would weld them all into one great body. We realised that the desire for a central organisation was genuine and widespread and felt it our duty to do everything we could to satisfy this great demand.

A Unique Brotherhood

So the Meccano Guild, the most remarkable brotherhood of boys in the world, came into being in the year 1919, with Mr. Frank Hornby, the inventor of Meccano, as its President. The announcement of the birth of the Guild was received with the utmost enthusiasm throughout the great army of Meccano boys of all nations, and applications for membership began to come in immediately in large numbers.

To-day there is scarcely a civilised country in the world where members of the Guild cannot be found. More than 100,000 boys in every corner of the globe have undertaken to do their utmost to fulfil the chief aims of the Guild, and its constitution has caused it to be described as a "Junior League of Nations." With these boys enthusiasm for their common hobby acts as a bond of union, and there is no doubt that the effect of the Guild on the actions of future generations, will go far toward justifying this description.

The Meccano Guild is the common bond that unites more than 100,000 members. Nearly 300 strong Meccano Clubs have been founded in all parts of the world, and as the above portraits show, their Leaders and members are of many nationalities.

The Three Objects of the Meccano Guild

The three objects of the Guild, set forth in the form of application for membership, are as follows :—

(1) To make every boy's life brighter and happier.
(2) To foster clean mindedness, truthfulness, ambition and initiative in boys.
(3) To encourage boys in the pursuit of their studies and hobbies, and especially in the development of their knowledge of mechanical and engineering principles.

In order to join the Meccano Guild it is necessary for the form of application to be filled up, signed and witnessed. This form is then sent to the Secretary with a remittance to pay for a badge. The applicant is then duly enrolled as a member of the Guild and his badge and membership certificate are sent to him. The neat little triangular badge—its three corners representing the three objects of the Guild—and the handsome certificate are always received with enthusiasm. The price of the Guild badge is 7d., or 1/– if sent overseas.

World-Wide Distribution of Meccano Clubs

The Guild originated for the benefit of Meccano Clubs and to-day there are nearly 300 of these organisations. Their world-wide distribution is remarkable. Strong and flourishing clubs exist not only in Great Britain, but also in the great Dominions, such as Canada, Australia, and New Zealand, and the movement is particularly strong in the Union of South Africa. It is not confined to boys of British race living within the boundaries of the Empire, for in addition the youth of India and Singapore have been wholeheartedly welcomed into this world-wide brotherhood.

The Meccano Guild has spread northward to Iceland, eastward to China and Japan, and westward to the Pacific Coast of America. It recognises no international boundaries and the boys of other nations are as keen to unite in order to derive the greatest enjoyment from their hobby as are the boys of British nationality. Many affiliated clubs having large numbers of members exist in Egypt. In France and Belgium the Guild has been specially successful and in those countries a large number of clubs are firmly established. Italy, Holland, Switzerland and Spain all add support to the movement ; and recently considerable progress has been made in Northern Europe, the Guild having obtained many recruits in Norway, Sweden and Denmark, where promising clubs also have been established.

Across the Atlantic Ocean, the youth of the two Americas have learned to appreciate the spirit that animates the Guild, and it is here that in the immediate future the greatest advance may be looked for. Steadily but surely the Guild is making progress in the United States. Its aims and objects make a strong appeal to the boys of that country, and the energy and determination that they invariably display in the tasks upon which they enter probably will result in a wonderful increase in the number of active and flourishing Meccano clubs. In South America great progress also is being made, and it has become necessary to print all Guild literature in Spanish. How rapidly the Meccano Guild is gaining ground in South America is shown by the fact that shortly a Spanish edition of the "*Meccano Magazine*"—the official organ of the Meccano Guild—will appear.

The organisers of the Guild have not overlooked the "lone" members. In many cases these live far away from the headquarters of a Meccano Club and often at a great distance from any other Meccano boy. For these members a Guild Correspondence Club has been formed. This places boys living in the remotest parts of the world in touch with others of similar interests.

With the Secretary

A Happy New Year!

This month I have the pleasure of wishing to all members of the Guild and of Meccano Clubs a very Happy New Year. This time my good wishes must be extended to a wider circle of Meccano boys than ever before, for there seems to be no check to the steady increase in the number of members. During the past year almost a record number of recruits have joined the Guild. The number of clubs also has increased in a satisfactory manner and, best of all, the clubs themselves have become stronger both in membership and in club spirit. To-day Meccano clubs in all parts of the world are recognised institutions, their Exhibitions and Concerts rank high among the social events of their districts, and their activities arouse extraordinary general interest.

Good Resolutions for 1930

During the first few days of January observant Meccano boys probably will notice that many people walk about with the steadfast air of those who have made good resolutions and are determined to keep them. I am afraid that most New Year resolutions are only made to be broken, but there is one that I should like every Meccano boy in the world to make and keep throughout the whole of 1930. This is that he will do his utmost, not only to carry out the chief aims and objects of the Guild, but also to introduce his friends to the delights of membership.

This would be a good resolution in every sense of the word, for it would mean that every member is helping somebody to get the best out of the world's greatest hobby. There is no reason why every member of the Guild should not find at least one new recruit, and I should like them to aim at doing this, which would strengthen very considerably the position held by the Guild.

Another good resolution that may be made by a Guild member is to write more regularly to the Secretary. At no time of the day am I in such an amiable frame of mind as when I am reading the letters that I receive daily from friends in all parts of the world. The number of these communications seems astonishingly large, but when I compare it with the number of members of the Guild I realise that in this respect I am not as fully in touch with members as I wish to be, and I hope that during the coming year my mail bag will show a record increase in weight.

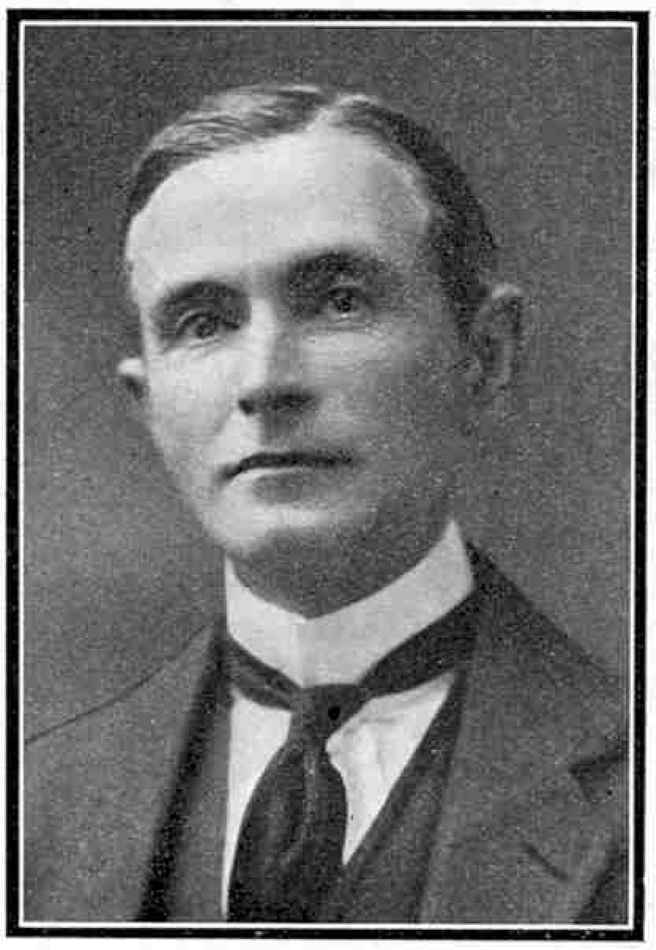
Successful School Clubs

In reviewing the work of the clubs during the past year I have been greatly impressed by the increase in the number of organisations that have been formed in connection with schools, particularly public and secondary schools. As a rule the Leaders of clubs of this kind are masters and very little experience is necessary to convince everybody that the formation of a school Meccano Club is a step in the right direction. On the one hand the club starts with a good room in which to meet, for usually the Headmaster willingly gives permission to make use of a classroom or laboratory; and on the other the formation of an association of keen Meccano boys eager to work together for the good of the club and of the school must greatly benefit the latter.

One of the most interesting features of the growth of these clubs is the manner in which they take part in important school events. The Meccano Club's annual exhibition of models often forms an important part of the proceedings on Speech Day, and visitors invariably show great interest in them. This interest is not confined to parents and friends, but is shared by the distinguished people always present on such an occasion, and many instances have been brought to my notice of the high opinions that they express both of the exhibits and of the value of the club.

Meccano Club Presidents

No. 6. Sir R. Newman, Bart., M.P.



Sir Robert Newman, Bart., M.P., is President of the St. Peter's and St. John's (Exeter) M.C., and takes an active interest in its work. This club was commenced as long ago as 1917 and has grown in numbers and enthusiasm until it has become one of the best known organisations in the city of Exeter.

Exhibition Announcements

The Victoria (Glasgow) M.C. are holding an Exhibition on the 25th January. Members have been busily engaged in preparing models and in making useful articles of many kinds for sale and the display promises to be extensive and very interesting. An invitation is extended to officials and members of other clubs in the neighbourhood, and Meccano boys who are not yet members of a club will be specially welcome. The Exhibition will be held in the hall of Victoria Park Church, Whiteinch, and will be opened at 3.0 p.m.

I wish to remind secretaries that I am always very pleased to make announcements of coming events of special interest. The appearance on these pages of a notice of an Exhibition or a Concert helps greatly in giving publicity to the activities of a club and may lead to increased membership.

The "*M.M.*" goes to press considerably in advance of the date of publication and therefore it is necessary that notice should be sent to me at least five weeks before the appearance of the issue of the magazine in which the notice is to be included. The notice also should state the place where the Exhibition is to be held and give the time when it is open to visitors.

Proposed Clubs

Attempts are being made to form Meccano Clubs in the following places and boys interested should communicate with the promoters whose names and addresses are given below:—

BLACKBURN—K. Charnley, 40, Infirmary Street, Blackburn.
GLASGOW—R. Yate, 14, Queen Square, Strathbungo, Glasgow, S.1.
HOLLAND—P. C. de Vries, Spaarndammerstraat 85, Amsterdam.
KENDAL—T. P. Bryer, "Wood Lynn," Gilling Gate, Kendal.

CLUB NOTES

Derby M.C.—Recent meetings have included Games Nights and discussions on engineering problems. More members are required and those wishing to join should communicate with the secretary. Club roll: 8. *Secretary*: R. J. Groome, 100, Uttoxeter New Road, Derby.

Borden Grammar School M.C.—Model-building in preparation for the December Exhibition occupied members' attention during last session. Several of the splendid models built are to be entered in Competitions announced in the "*M.M.*" At one meeting a Lantern Lecture loaned by the De Havilland Aircraft Co. Ltd. was shown, and proved very interesting. Club roll: 60. *Secretary*: H. W. E. Rivett, 48, Ridham Avenue, Kemsley, Milton Regis, Kent.

Great Baddow M.C.—Visitors' Night was a great success. Members exhibited many fine models and presented a very enjoyable concert. Contributions amounting to £6 were collected from visitors. The Football Team continues to show excellent progress. Club roll: 39. *Secretary*: Miss D. K. French, High Street, Great Baddow.

St. Peter's and St. John's (Exeter) M.C.—Sir Robert Newman, Bart., M.P., has kindly accepted the Presidency. When visiting the club rooms he was greatly interested in the Hornby Railway Layout and the models under construction. The latter included a representation of the Exeter Motor Cycle Racing Track, and an Aeroplane built by the youngest member aged 8. The club magazine "*The White Triangle*" improves with every number. Club Roll: 40. Leader: Mr. M. C. Hodder, 60, Elmside, Exeter.

Pharos M.C.—Visits to places of interest are arranged monthly. On one of these members inspected a Flour Mill under the guidance of the Managing Director. A Grand Model-building Competition was keenly contested. Prizes of Meccano parts or Hornby Train goods were awarded, winning models including a Clock, Elevated Jib Crane, and a Boiler Transporter. A Lantern Lecture "*The Centenary of Railways*" was given by the Leader, the slides being kindly loaned by the L.N.E.R. Club Roll: 42. *Secretary*: S. E. Teasdale, 21, East Cliff, Dover, Kent.

Horsforth M.C.—Members are generally interested in Model-building, but attention is paid to games and other hobbies. An extensive Hornby Train Layout has been constructed and various suitable excursions are being made. A separate Electric Layout is to be built. At many meetings extracts from the "*M.M.*" are read. Club roll: 24. *Secretary*: J. K. Sutcliffe, Atlas House, Horsforth.

Gaywood M.C.—Model-building continues to be the chief pursuit of members, and excellent models of a Motor Chassis and a Steamship have been constructed. An Exhibition was held, prizes being awarded for the best models on view. Contractors' Nights are a special attraction. Club roll: 9. *Secretary*: P. F. M. Coverdale, Gaywood Park Road, Solihull, Birmingham.

St. Mary's (Wavertree) M.C.—The club Concert attracted a very large number of visitors and was a great success. Four plays were presented and models loaned from Headquarters were displayed. A large Wireless Set provided music, and the proceeds amounted to the satisfactory sum of £9. Club roll: 11. *Secretary*: F. Joyce, 47, Northdale Road, Wavertree, Liverpool.

The Leas (Hoylake) M.C.—Interesting Lectures have been given on "*Liquids*" by the Leader, and "*Lubricants*" by Mr. L. P. Dealtry, the Headmaster of the School. A member also has given an interesting talk on "*Asbestos.*" Interesting Model-building Competitions are held continuously. Club roll: 56. *Secretary*: J. F. Barnes, The Leas, Hoylake.

Dunoon District M.C.—Is making good progress. A varied syllabus is being followed, Model-building Nights alternating with Games and Stories Evenings. Club roll: 23. *Secretary*: Wm. D. Laird, "Parkroyd," Victoria Road, Dunoon, Argyll.

Bedlington Secondary School M.C.—Interesting models constructed have included a Theodolite, Motor Lorry, Aeroplane and an Arch Bridge. On a recent Hornby Train Night locomotive speed contests were arranged. The scale speed of the No. 2 Tank Locomotive was 130 m.p.h., and that of a No. 1 Tank worked out at no less than 180 m.p.h. An invitation to a Concert held by the Newcastle M.C. was accepted by three officials on behalf of the club. Club roll: 21. *Secretary*: J. W. Dobson, 1, Portland Terrace, Ashington, Northumberland.

Greenford M.C.—Members visited the Rockware Glass Works at Greenford, and were particularly interested in the Electric Telpher employed. Hornby Train Nights are frequently held, accessories such as Signals, Stations, Cranes, etc., being made from Meccano parts. Club roll: 9. *Secretary*: C. Howe, 145, Costons Lane, Greenford.

Portsmouth and Southsea M.C.—Model-building Competitions are frequent and models of really excellent design have been exhibited, these including a Dredger, Motor Chassis and a Motor Cycle. Mr. Walters, winner of a gold medal at the Model Engineers' Exhibition, gave a particularly interesting lecture on "*Model Speed Boats.*" Other talks have been given by Rev. F. Horrox on "*The Beginning of Wireless,*" and by the Leader and Secretary on "*Aeroplanes,*" and "*Coal Mines*" respectively. A Firework Display in November was followed by a demonstration of a Model Engine. Club roll: 34. *Secretary*: J. S. Kent, 57, Kirby Road, North End, Portsmouth.

Harehills (Leeds) M.C.—A Mock Trial was held and greatly enjoyed. Model-building Contests are regularly arranged, and a Debate on "*Torpedoes v. Guns*" was keenly contested. Club roll: 28. *Secretary*: J. Issott, 9, Milan Road, Harehills Road, Leeds.

Wimbledon M.C.—A Lecture on "*How Newspapers are Produced*" was very interesting, the lecturer giving practical illustrations of the manner in which the type is set up, etc. Members are constructing a Meccano Clock for display in the window of a local shop. A Table Tennis Tournament has been held and other indoor games have been introduced. Club roll: 26. *Secretary*: M. O. Carroll, 34, Drax Avenue, Wimbledon, S.W.20.

Galashiels M.C.—A splendid programme of Model-building Evenings, Debates and Lantern Lectures has been arranged. A Lecture on "*London's Buses*" was shown at one meeting and members then built a Meccano Omnibus from the No. 7 Outfit possessed by the club. The Omnibus is a six-wheeled double decker. Club roll: 25. *Secretary*: D. Richmond, 58, St. John Street, Galashiels.

Bramley (Leeds) M.C.—The Football Team has arranged fixtures with other Meccano clubs in the neighbourhood. A Debate "*Road v. Rail Transport*" brought out excellent arguments and was keenly contested. An Exhibition and a Surprise Supper were among the chief events of last session, and both proved highly successful. Club roll: 18. *Secretary*: N. Smith, 1, Highfield Street, Bramley, Leeds.

Wolverley School M.C.—Mr. W. S. L. Hargrave, Master at the School, has kindly agreed to act as Leader. In a Simplicity Competition prizes were won by excellent models of a Dirt Track Racing Motor Cycle, and a Swivelling Steam Crane. Other interesting entries included an old-fashioned Bicycle, a Trench Mortar, a Racing Seaplane, and an Automatic Pay Desk. Interesting talks have included one on "*Cameras and Photography*" by the Leader. Club roll: 33. *Secretary*: W. F. G. Gadsby, Wolverley School, Kidderminster.

Uttoxeter M.C.—A more convenient club room has been secured. Model-building Evenings, Competitions, and Magazine Nights have been held. Several members have given interesting short talks and the Leader, Mr. H. E. Griffiths, also has given a Lecture. At one meeting the articles on "*Television*" that appeared in the "*M.M.*" were read. Club roll: 11. *Secretary*: S. W. Cross, 25, New Road, Uttoxeter.

Brades M.C.—Model-building Evenings have been varied by Games Nights and Socials. Competition Nights are a special attraction and contests are very keen. Members presented two sketches at a Concert in aid of Church Extension Funds. Club Roll: 32. *Secretary*: G. Evans, 148, West Bromwich Street, Oldbury, Nr. Birmingham.

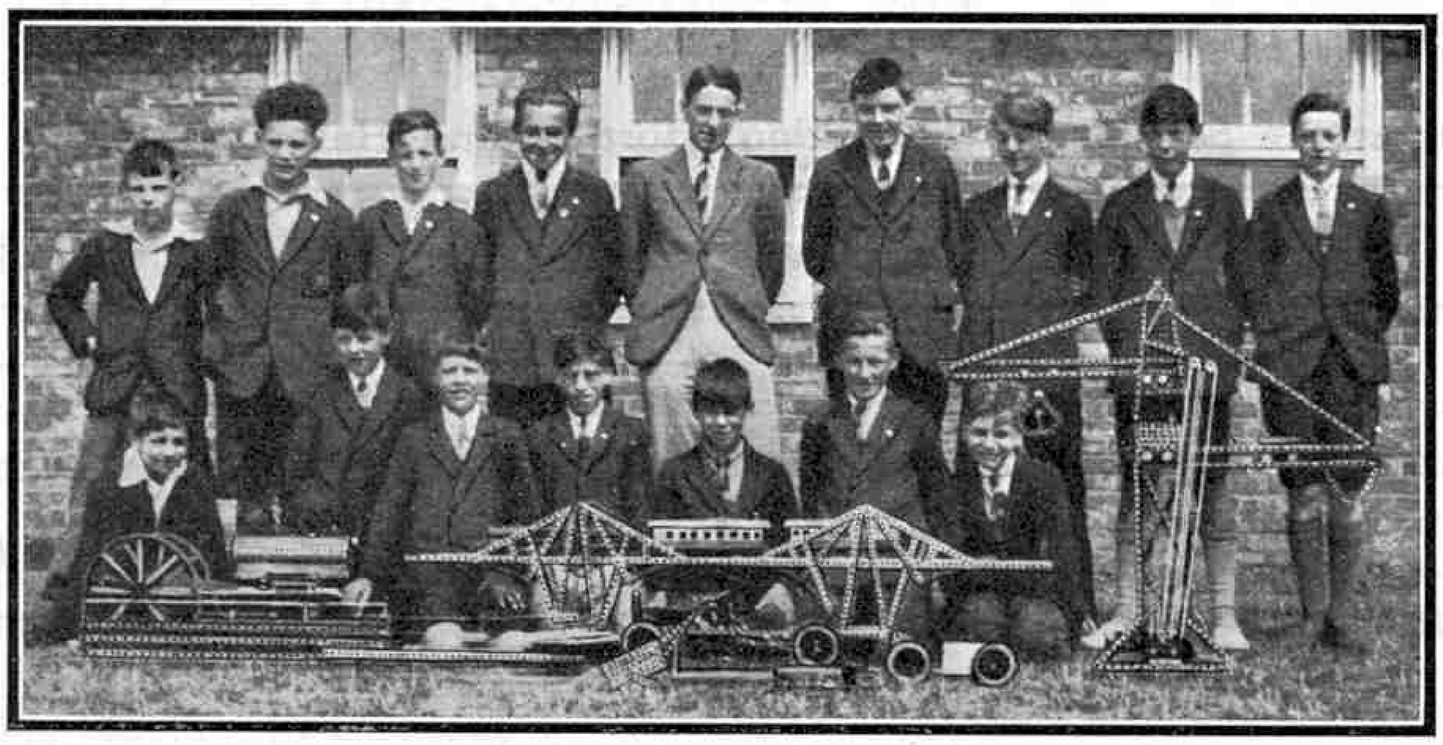
Pleckgate (Blackburn) M.C.—Two sections have been formed and Competitions between the two are arranged regularly. A Recruiting Campaign has been started in order to increase the resources of the club, and boys wishing to join should write to the Secretary. Club roll: 8. *Secretary*: G. Hindle, 87, Ramsgreave Drive, Blackburn.

Chertsey M.C.—A Stamp Section and a Cycle Club have been formed. The Secretary gave a Lecture on the "*Story of Railway Signalling,*" and Model-building Contests and Games have occupied other meetings. A Social was held at Christmas, when plays written by the secretary and C. Rymell, a member of the club, were presented. A Magazine is to be published monthly. Club roll: 25. *Secretary*: E. V. Brown, Arbon Grove Cottage, Lyne, Chertsey.

Cecil Road (Gravesend) M.C.—Interesting visits have been paid to South Kensington Museum, Gravesend Gas Works, the Imperial Paper Mills, and Tilbury Docks, where members inspected a liner. An Exhibition of models held in December was very successful. Club roll: 20. *Secretary*: G. N. Cottle, 53, Cecil Road, Gravesend.

St. Albans M.C.—At one meeting short talks were given by members on subjects previously prepared. The secretary gave an interesting account of Liverpool and the Meccano Factory. Many excellent models constructed have included a splendid Meccano Lorry. Club roll: 16. *Secretary*: L. G. King, "Buckingham," Kingsbury Avenue, St. Albans, Herts.

Bedlington Secondary School M.C.



The Bedlington Secondary School M.C. was affiliated in February, 1929, under the Leadership of Mr. E. Sykes, who is standing in the middle of the second row in our photograph. Members are keen model builders, and the display of models at the club's first Exhibition greatly impressed a large number of visitors.

Oundle M.C.—The programme has included a very interesting talk on "*Aviation*" by Mr. Batt, and a Debate—"*Mathematics v. Languages in Business Life.*" The President has organised a Christmas Club to enable members to increase their stocks of Meccano parts. An interesting innovation is that several members have undertaken to arrange Special Evenings. Club roll: 15. *Secretary*: G. E. Straw, Ewelme, Oundle, Northants.

Westbury M.C.—The Leader has been compelled to resign on account of pressure of work, but Mr. C. H. E. Badcock has very kindly taken up the position. Members were greatly interested in a film "*The Age of Speed,*" kindly exhibited and explained by Mr. Knowles of the Norton Grinding Wheel Co. Football is the chief recreation and interesting fixtures have been arranged. Club roll: 27. *Secretary*: E. D. Moye, 24, Burnell Rise, Letchworth.

St. Saviour's (Faversham) M.C.—This club is making splendid progress and has held its First Annual Exhibition. Many splendid models on view were judged by two local gentlemen, and prizes were awarded to the constructors of a covered Motor Lorry, the Eiffel Tower, and an Anti-aircraft Gun. A model of "*Drop the Nigger*" was awarded a consolation prize. A Meccano model loaned from Headquarters attracted considerable attention. Receipts amounted to £1/16/–. Club roll: 18. *Secretary*: A. Gregory, 39, East Street, Faversham.

Chelmsford M.C.—An instructive Lecture by the Assistant Leader on "*Models and How to Construct Them*" was highly appreciated by members. Games Nights have been organised, a Hornby Train Layout has been constructed, and each member takes control in turn. Club roll: 28. *Secretary*: Miss Flexman, Saracens Head Hotel Tap, High Street, Chelmsford.

South Africa

Villieria (Pretoria) M.C.—Recent interesting meetings have included a "Crime Evening" and Model-building Nights, when a Hornby Engine and an Electric Locomotive were constructed as club models. The club exhibits at the local Agricultural Show attracted great attention. Visits have been paid to the Royal Mint and to a Diamond Mine. Club roll: 20. *Secretary* J. F. Wood, 723, 5th Street, Villieria, Pretoria.

Satisfaction!

A Selection from Thousands of Unsolicited Testimonials from Warneford Enthusiasts.

Woodford Green.

"I may say that the 'Swift' Model Aeroplane which I had at Xmas is giving me the utmost satisfaction, and is the only Model Aeroplane I have yet struck that will do what it is supposed to.

(Signed)..... "

Burnley.

"I am highly satisfied with your Warneford 'Marvel' Construction Set.

(Signed)..... "

New Zealand.

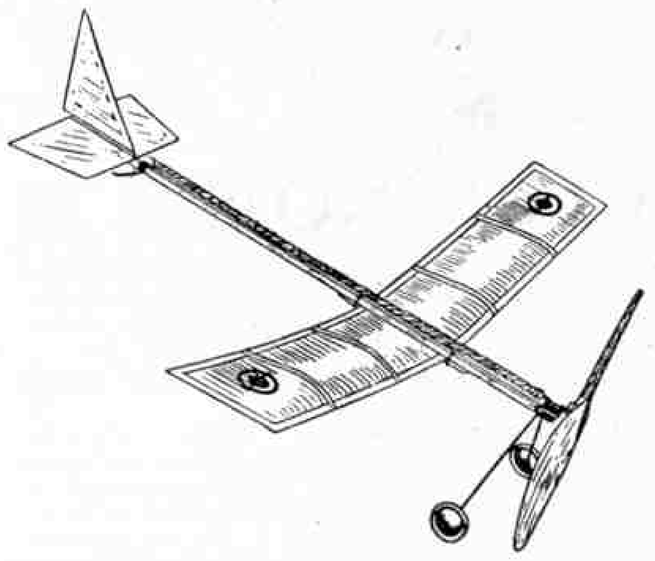
"I got one of your 'Demon' Model Aeroplanes, and wish to say that I am delighted with its performance.

(Signed)..... "

Cambs.

"The little 'Moth' is the finest value for money I have ever come across. The performance is simply amazing. I can obtain 250-300 yards any day.

(Signed)..... "



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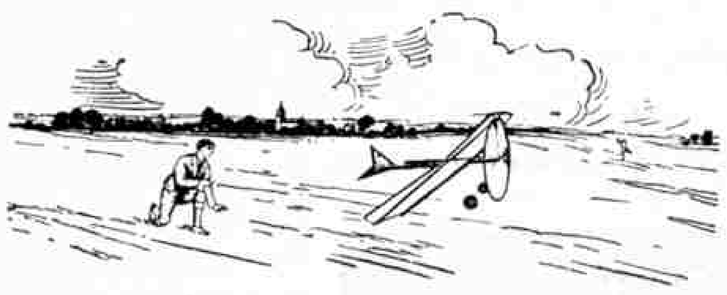

FOR THE WINTER EVENINGS—

Build this 15 in. Tractor Monoplane weighing only ¼ oz. Made from the lightest wood in the world. Quite simple to assemble, and a wonderful flyer. Complete set of parts with full size working drawing.

The "Warneford Marvel" Construction Set Price 1/6

See Our Exhibit at the Schoolboys' Exhibition, Horticultural Hall, Dec. 31st to Jan. 8th, 1930

Sole Manufacturers: F. J. MEE, Greenwich Road, LONDON, S.E. 10 PRICE LISTS POST FREE

MECCANO ACCESSORY PARTS

BUILD BIGGER AND BETTER MODELS

It is the ambition of every keen Meccano boy to build bigger and better models. That is why he constantly increases the scope of his Outfit by adding Accessory parts.

There are over 250 real engineering parts in the Meccano system, every one of which can be obtained from any Meccano dealer. Ask your dealer for a complete illustrated list of Meccano Accessory Parts, or write direct to us for a copy.

Remember that the model-building possibilities of the Meccano system are limitless. The more parts you have, the bigger and better the models you will be able to build and the more fun you will be able to obtain from the hobby.

A selection of Meccano parts is shown here. The prices of these are as follows:—

Part No.			Price s.	d.
21	Pulley Wheels, 1½" diam., with centre boss and set screw	each	0	4
*30a	Bevel Gears, ½", 16 teeth		0	6
*30c	Bevel Gears, 1½", 48 teeth		1	6
	* (Can only be used together).			
72.	Flat Plates, 2½" × 2½"	each	0	2
90a	2½" Curved Strips, cranked 1⅜" radius, 4 to circle ...	,,	0	1
131	Dredger Buckets ...	½ doz.	1	0
138	Ship's Funnels ...	each	0	9
142a	Dunlop Tyres to fit 2" diam. rim ...	,,	0	4½
150	Crane Grabs ...	,,	0	7

Part No.			Price s.	d.
152	Pulley Blocks, 2 sheave	each	0	9
154a	Corner Angle Brackets, ½", right hand	½ doz.	0	6
154b	Corner Angle Brackets, ½", left hand	,,	0	6
157	Fans, 2" diam. ...	each	0	4
160	Channel Bearings, 1½" × 1" × ½" ...	,,	0	2
161	Girder Bracket, 2" × 1" × ½"	2 for	0	3
164	Chimney Adaptors	each	0	2
169	Digger Buckets ...	,,	2	0
170	Eccentrics, ½" throw	,,	0	9
171	Socket Couplings ...	,,	0	9

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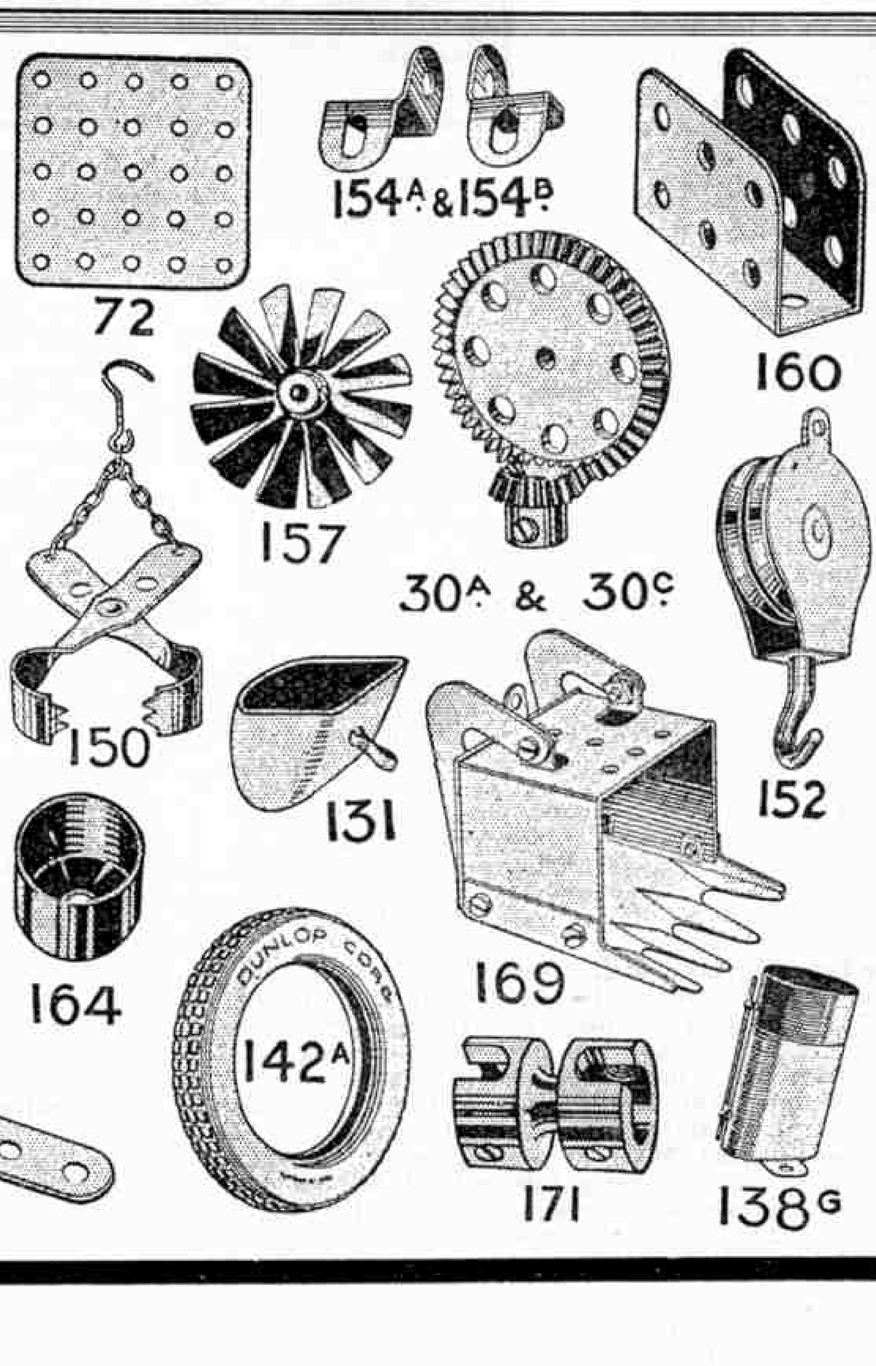


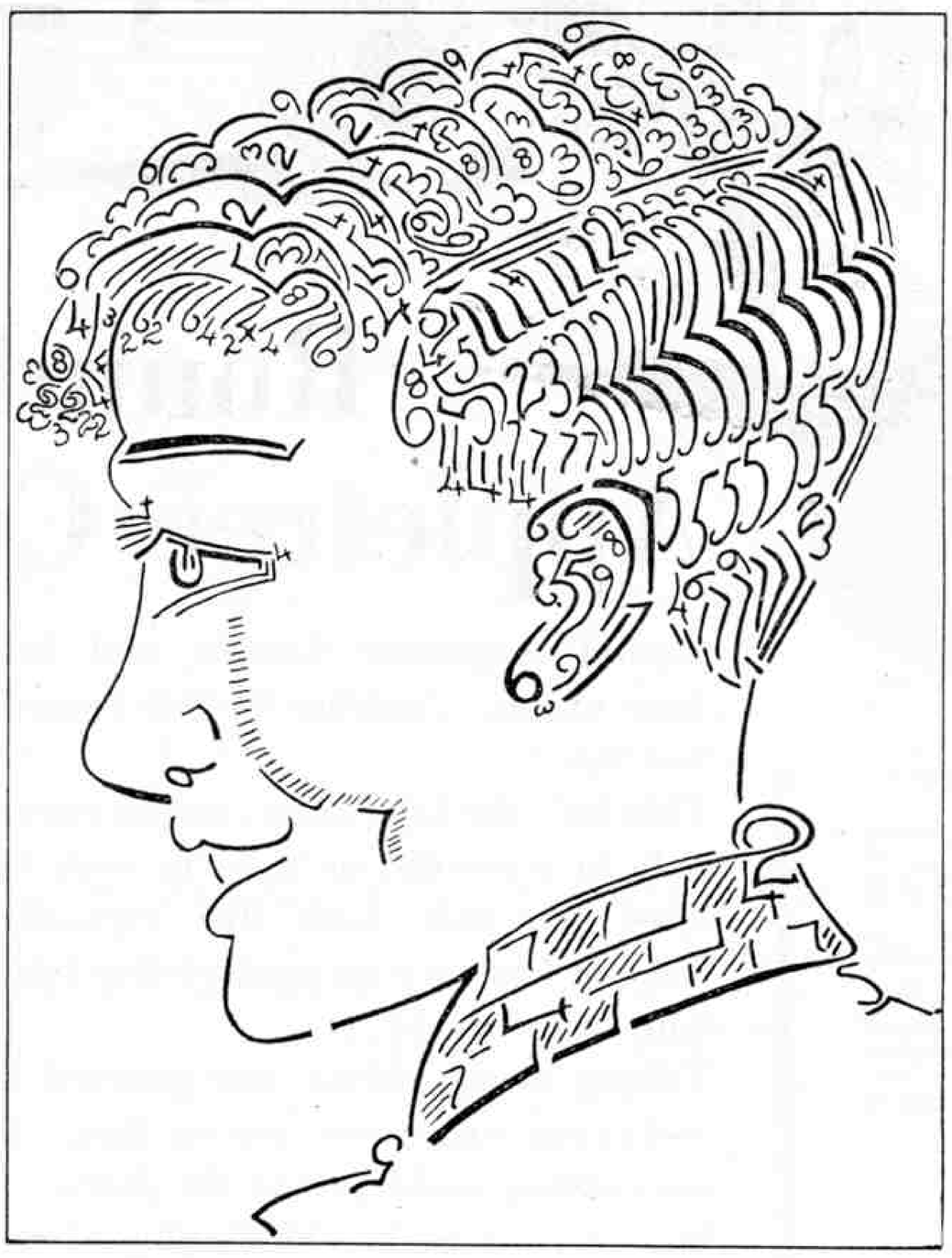
Competition Page

Can You Count?

THE wonderful popularity of the "Locomotive Figures" Competition published in the November, 1929, "*M.M.*" leads us to test our readers with another contest of the same kind. This time, however, the puzzle is much more difficult and in consequence more fascinating.

We illustrate on this page a Meccano boy's face in profile, and close inspection of the drawing will reveal that every line is a numeral! Readers are invited to test their skill by locating and adding together the value of the numerals comprising the complete drawing. The only qualifications required for success in this competition are good eyesight and an abundance of that rare but useful quality, patience.

It is simply a matter of skill in finding every figure and adding it to its fellows. There are no obscured or hidden figures, but some, of course, are upside down. It will assist in locating the figures correctly if the drawing is studied from various angles, upside down, sideways, and so on. The sixes and nines must be scrutinised with particular care. In order to facilitate identification of these two numerals it should be understood that the loop of the nines is closed and joins up to the stem of the figure; the loop of the sixes is open.



There are no combinations of two or more figures to make numbers having values exceeding 10, such as 32 or 156; therefore, each figure is to be counted separately and added to the total of its fellows just as if they stood one above the other in a single column. The figures employed range between 1 and 9 inclusive, and every stroke in the drawing has a value.

In order to ensure that no one shall know the exact total of the figures before the closing date, we have again adopted the method of preserving secrecy employed in connection with the former contest. The Editor and the judges each erased a figure from the drawing before it was reproduced. No one knows which figure the others took out, but each made a note of the figure he erased and placed it in an envelope, which was sealed and is now locked up in the Editor's desk, there to remain unopened until the closing date. When the contest closes the numbers in the envelope will be added together and their sum subtracted from the known total in the original drawing, to give the correct answer.

Prizes of Meccano or Hornby Goods (to be chosen from our catalogues by the winners themselves) to the value of £1/1/–, 15/–, 10/6 and 5/– respectively, will be awarded to the senders of the four nearest estimates in order of merit. In addition a number of handsome consolation prizes will be awarded to the readers whose entries come next in order. In the event of a tie for any of the prizes, the basis of judgment will be neatness and novelty of presentation.

No competitor may submit more than one entry, which must be written clearly on a post card, together with the competitor's full name and address. Entries must be addressed to "Figure Face, Meccano Magazine, Binns Road, Old Swan, Liverpool," and must be sent to reach this office not later than 31st January, 1930. Overseas closing date, 30th April, 1930.

Another Eye Teaser

Competition Results

HOME

Loco Figures.—The entry to this contest was the biggest for any "*M.M.*" competition of recent years, but in spite of this, less than sixty boys succeeded in arriving at the correct figure, which must, of course, remain a secret until the closure of the Overseas section.

As some consolation for the terrific teasing to which competitors submitted in this contest, it has been decided to award a prize to every competitor who gave a correct answer. It is impossible to publish the full list of consolation prizes awarded, but this is available for the inspection of anyone who is interested.

The major awards were secured by:—1. F. A. Bennett (Birmingham); 2. W. Christian (Eastbourne); 3. R. Barbary (Mevagissey, Cornwall); 4. A. H. Johnson (Dudley).

29th Drawing Contest.—First Prizes: Section A, E. A. Boughey (Herne Hill, S.E.24); Section B A. Ingram (Liverpool). Second Prizes: Section, A, H. Coble (Edgware, Middx.); Section B, A. M. Johnston (Dunstable). Consolation Prizes: L. T. Levitt (Swansea); C. P. Plantin (Westcliff-on-Sea); R. C. Randall (St. Albans); H. Tooley (Rothwell).

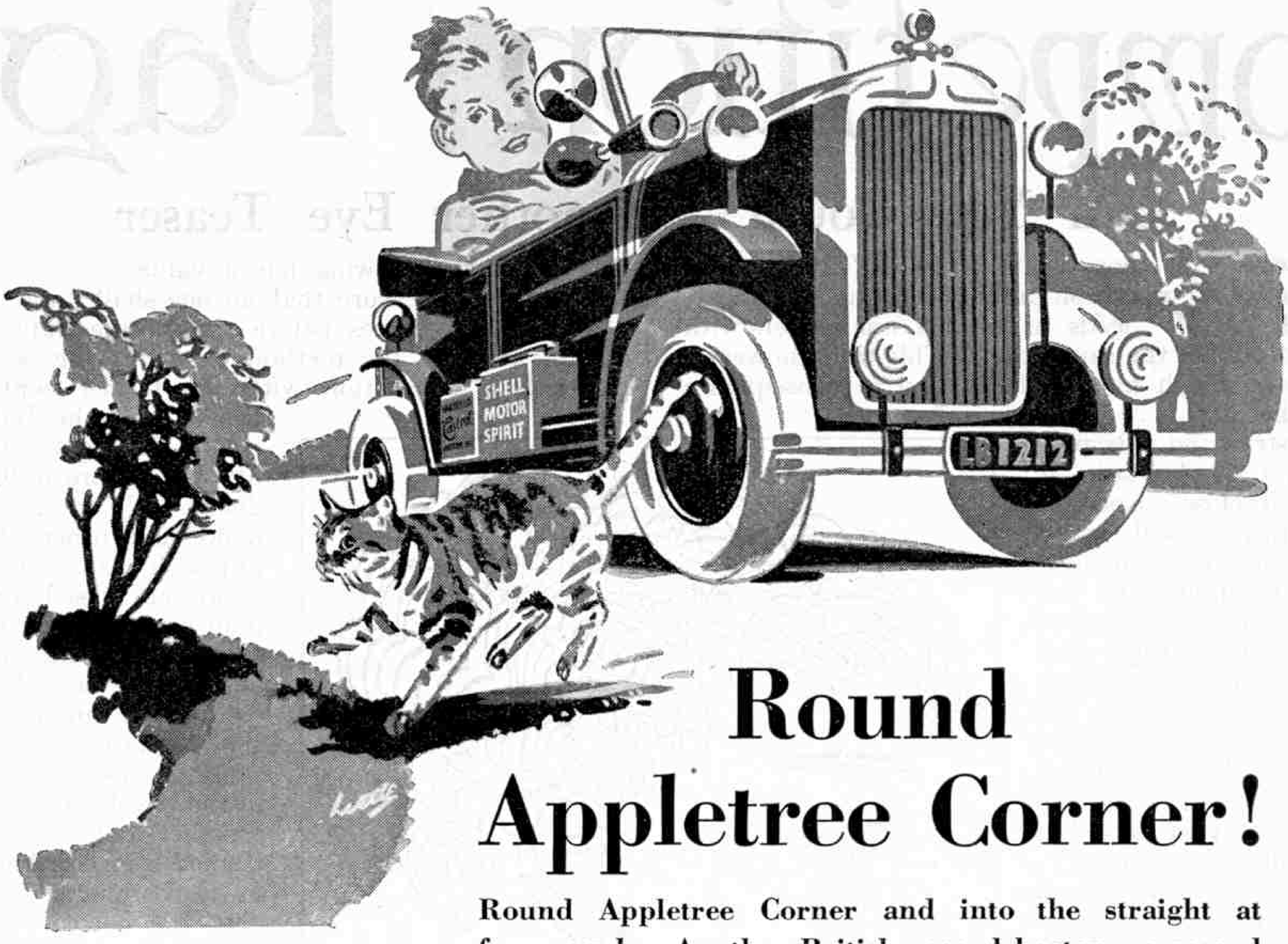
OVERSEAS

Sketchograms No. 3.—First Prizes: Section A, M. P. Senji (Madras); Section B, P. A. Senji (Madras). Second Prizes: Section A, S. F. Desai (Navsari, India); Section B, C. Fearnley (Otaki, N.Z.). Consolation Prizes: L. G. Mauger (Cranbrook, W. Australia); M. Reynolds (Toronto).

Grand Summer Holiday Contest.—Photographic Section.—First Prizes: Section A, E. Worthington Vancouver, B.C.); Section B, C. J. McCain (Sydney, N.S.W.). Second Prizes: Section A, C. M. Newton (Sydney, N.S.W.); Section B, H. N. Eustis (Alberton, S. Australia). Third Prizes: Section A, G. F. Samuels (Paris); Section B, S. H. Schroeder (New York, U.S.A.).

Sketches Section. First Prizes: Section A, A. E. Sundarsson (Madras); Section B, J. A. Rodriguez (Montreal). Second Prizes: Section A, J. Enos (Lagos, Nigeria); Section B, G. Brown (Taranaki, N.Z.). Third Prizes: Section A, S. M. Thompson, Wellington, N.Z.); Section B, R. B. Hughes (Vancouver).

Essay Section. First Prizes: Section A, M. P. Senji (Madras); Section B, M. A. Thomas (Udamalpet, S. India). Second Prizes: Section A, J. Hyde (Matakohe, N.Z.); Section B, E. L. Meek (Wellington, N.Z.). Third Prizes: Section A, F. Thomas (Auckland, N.Z.); Section B, J. D. L. Mulcahy (Victoria, Australia).



Round Appletree Corner!

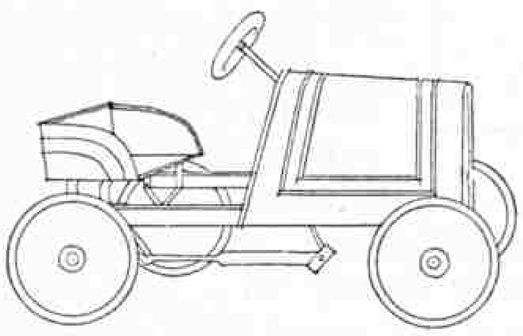
Round Appletree Corner and into the straight at four m.p.h. Another British record beaten—a record for fun!

This isn't the kind of toy motor car that breaks its back-axle in a month, or loses its nuts in a week. Tri-ang Cars not only look like cars–they last like cars. Tri-ang Cars are an engineering job. "Ask the 'man' who owns one!"

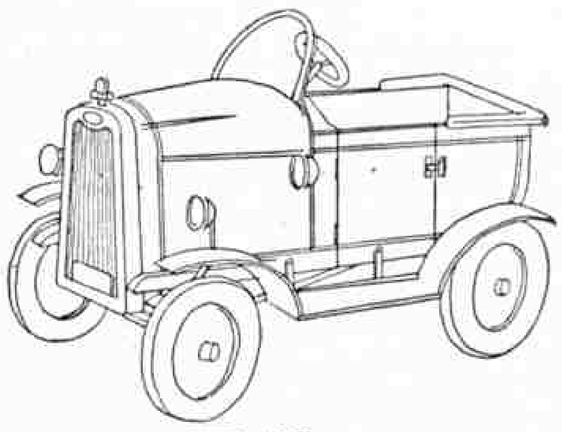
Tri-ang owner drivers are guarded from driving strain —Tri-ang engineers see to that. Light steering and easy sitting make fun of the miles. Cushion tyres, and ball-bearings make child's play of racing the car along. Just look at the specifications. If you want to be a success this Christmas, give a Tri-ang Car. Prices from 15s. to £15 15s. 0d. Every one good value.

Brief Specification: **Twin push stroke (2 leg power R. S. P. C. C. rating). *No tax* on the driver. *No insurance* necessary. *Maximum brake horsepower*— Tri-ang Cars don't break.**

TRI-ANG
"BUICK EMPIRE ROADSTER."
(*Illustrated above.*)
Replica of Buick radiator heavily plated. Chain drive to ball-bearing axle. 11 in. steel disc balloon wheels, cushion tyres. Nickel plated bumpers, domed mud-guards. Splintex adjustable windscreen, driving mirror, bulb horn, licence holder, 5 lamps. Starter on dashboard (makes realistic noise when pressed). Adjustable upholstered seat, number plates, tool box, luggage grid, oil and petrol spare cans. Price, ready for the pavement - - - - **£4 10 0**



TRI-ANG LIZZIE No. 3 - - **15/-**
All-steel body. Easy running double crank drive. 8 in. rubber tyred wheels. 6 in. steering wheel. Lamp. Rubber pedals. Recommended for motorists from 2 to 5 years old.



TRI-ANG
CHEVROLET DE LUXE No. 4 - **29/6**
Scale model Chevrolet radiator. Easy running, double crank drive. 9 in. steel disc balloon wheels. Rubber tyres and pedals. Accessories include 4 lamps and motometer. Side door opens.

TRI-ANG

MOTOR CARS 15/- TO £15-15-0

Count them on the pavement!

★Tri-ang Cars are on view at most Toy Shops. Write for folder of Tri-ang Cars and other Tri-ang Toys, illustrated in full colours **FREE ON REQUEST.**

LINES BROTHERS LIMITED, MORDEN ROAD, LONDON, S.W.19

Fireside Fun

LOCAL KNOWLEDGE

The motorist was lost. Noticing a yokel approaching, he pulled up his car and questioned the man.

"Can you tell me where these roads lead?" he inquired.

"Oh, aye!" said the countryman slowly. "That road goes to my 'ouse, t'other do go to Varmer Brown's, and this un keeps goin' straight on."

* * * *

Golfer: "Notice any improvements since last year?"

Caddie: "'Ad your clubs shined up, 'aven't yer!"

* * *

Donald: "Are you fond of moving pictures, son?"

Son (hopefully): "Aye, Pop."

Donald: "Then maybe ye'll help me get half-dozen out o' the attic."

* * *

Visitor: "What a sad looking library."

Librarian: "Why? Because it has panes in the windows?"

Visitor: "No, the books are in tiers."

* * *

Smith: "I can see nearly a quarter of a million miles."

Brown: "I don't believe you."

Smith: "How far away is the Moon, then?"

* * *

Teacher: "Why were you absent yesterday, Johnnie?"

Johnnie: "Please, sir, I had toothache."

Teacher: "Is it better now?"

Johnnie: "I don't know, sir. The dentist kept it."

* * *

Mabel (to her brother): "Harry, why is it that at Church they always say 'Amen' and never 'Awomen?'"

Harry: "I don't know, unless it's because they sing hymns and not hers!"

* * *

Clifford (caddying for his father and noticing that his ball is covered with mud): "Say, dad! That's a disreputable thing you're playing with!"

Dad's Partner: "Now then, Clifford! I won't have you calling me names!"

* * * *

Billie (to chemist): "Please, sir, I want some soap with a very strong perfume."

Chemist: "What's the idea, sonny?"

Billie: "Well, I want mother to know when I've washed my face so she won't make me do it all over again!"

* * * *

"Oh, aye," said the boaster, "I suppose I've travelled to every corner of the globe in my time."

"That is impossible," said the bored listener. "The globe is a spherical body, and therefore has no corners!"

* * * *

"Why are you staring at me like that?" demanded the big man in the railway carriage of a little boy opposite.

"Pl-please, sir," stammered the little boy, "because there's nowhere else to look!"

JUST A LESSON

The express was not living up to its reputation. First it would go forward fifty yards or so, then back, then stand still, puffing uncertainly; and then carry out the performance all over again. At last one of the travellers called the guard.

"What's the matter with this train?" he demanded, "why is it backing up and jerking forward in this manner?"

"It's quite all right, sir," the guard assured him. "It's only the engine driver teaching his wife to drive."

* * * *

Reggie: "Will your watch tell you the time?"

Bobbie: "No, you have to look at it."

* * * *

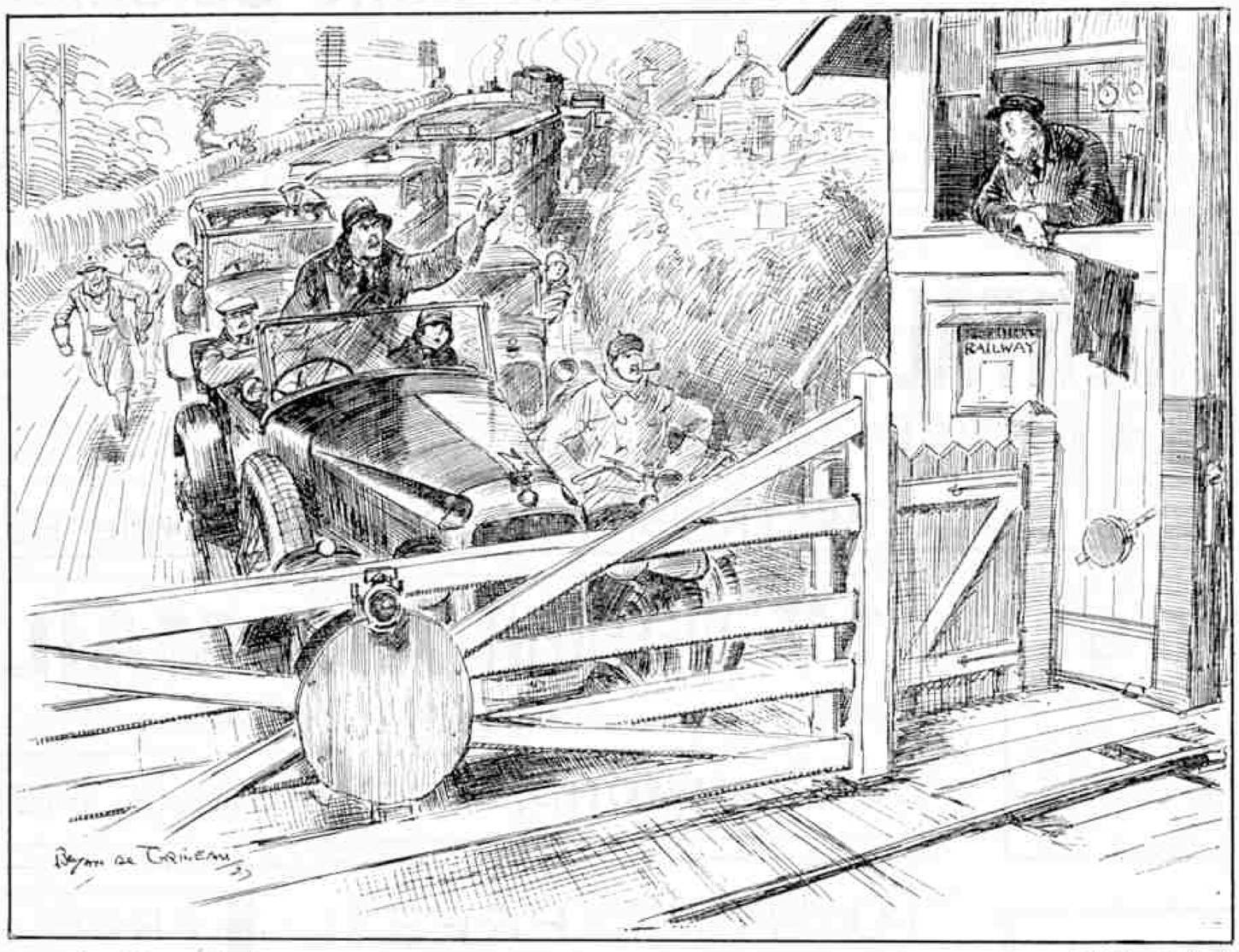
"I say, mother, your hair is permanently waved, isn't it?"

"Yes, dear. Why?"

"Well, can't I have my neck permanently washed?"

* * * *

"Lumme, Bill!" said Bert during a duet at the village concert, "they must be in a terrible hurry; they're putting two on at a time, now!"



Reproduced by courtesy] ["*The Motor*"

Irate Motorist: "Hi! How long is this train going to be?"
Signalman: "Engine and six coaches, I expect!"

Guide (showing tourist over the Pyramids): "It took two thousand years to build these."

Tourist: "Our bricklayers are proverbially lazy, too!"

* * * *

The actor believed he could act, and he let the world know it.

"When I am on the stage," he declared, "I lose sense of all about me, the audience completely disappears —"

"Yes," said his candid friend. "And who can blame it?"

* * * *

Two youths were discussing an acquaintance.

"The colossal cheek," said one. "He actually told me he could get a job with anyone he pleased."

"Then why hasn't he got one?" queried the other. "He probably hasn't pleased anybody yet."

* * * *

Sam: "Do yuh refuse to pay me dat two dollahs Ah lent you?"

Rastus: "Oh, no, sah. Ah don't refuse, Ah jes' refrains."

A SOUND IDEA

An employer spent a great deal of money to ensure that his men should work under the best of conditions, and consequently expected a greater output of work. One day he called the men together and told them exactly how much he had spent in bettering their conditions.

"Now, whenever I enter the workshop," he said, "I want to see every man cheerfully performing his task, and therefore I invite you to place in this box any further suggestions as to how that can be brought about."

A week later the box was opened; it contained only one slip of paper, on which was written: "Don't wear rubber heels!"

* * * *

The negro woman walked into an insurance office and inquired: "Does you hab any of dat fire insurance here?"

"We do," replied the clerk at the counter: "what do you want insured."

"My husband," was the reply.

"Then you don't want fire insurance," smiled the clerk as he reached for another application form. "What you want is a life insurance policy."

"No, I don't," she exclaimed. "Ah wants fire insurance. Dat nigger's been fired fo' times in de last two weeks."

* * *

"What time is the next train to Manchester?"

"You'll have to wait until 4.30, Miss!"

"Will you be able to tell me then?"

* * *

Judge: "Why did you steal the watch?"

Pitter: "I was going along, I saw that the watch was going, too, and I thought: 'Why can't we go together?'"

* * *

The motorist had an accident with his light car. He limped painfully to a telephone box and called up the nearest garage.

"Hello," he said. "I've turned turtle. Can you do anything for me?"

"I'm afraid not," came the reply. "You've got the wrong number. What you want is the Zoo."

* * *

Little Emily had been to school for the first time in her young life.

"Well, darling, and what did you learn there?" asked her fond mother on Emily's return.

"Nuffin," sighed Emily hopelessly. "I've got to go back to-morrow."

* * * *

George: "My Uncle Henry is awfully absent-minded. He went out yesterday to buy a tea-set for Auntie, and what do you think he brought back?"

Harry: "I'm sure I don't know."

George: "Well, he brought her home a settee!"

* * * *

The man had an important engagement to keep, and consequently was greatly annoyed by the slow movements of the barber who was shaving him.

"Keep the brush still," he said at last in exasperation. "I'll waggle my head!"

* * * *

An employer whose workmen had made a habit of asking for special leave on the slightest pretext, caused the following notice to be posted in the works:

"Notice: All requests for leave of absence on account of toothaches, severe colds, and minor physical ailments, and on account of church picnics, weddings, and the like, must be handed to the foreman in charge of the department before 10 a.m. on the morning of the game."

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This wonderful gift contains Stamps from Angolia, Azores, Cape Verde Islands, Lourenzo Marques, Mozambique, Mozambique Co., Congo, Portuguese India and Guinea, St. Thomas and Princes, etc. **Send 2d. to cover Postage and ask to see my world-famous Approvals,** and this fine gift will be sent by return post.

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Including Austria, **Belgium (1929 lions)**, Canada, Cuba (unused), **Falkland Is.** (penguin), F.M.S., Fr. Guiana, Fr. India (new issues), **Guatemala $1.50** (at 4d.), Holland (1929), Italy (wolf), **Nyassa,** Poland (1929), Roumania, Russia (unused), **Spain (Catacombs,** Cat. 4d.), Switzerland (1867), Ukraine, Upper Volta (native chief), **Vatican State.** I will send this collection **absolutely free** to all stamp collectors sending 1½d. postage (abroad 2½d.). Only one gift to each applicant. **Mention 1930 offer.**

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EDWARD SANDELL, 10-11, FETTER LANE, LONDON, E.C.4

THE "ORIENTAL" PACKET

This packet contains **30** *good class* **Oriental** stamps only (no common continentals) and is mostly comprised of beautifully printed pictorials, views of towns, ruins, mosques, minarettes, gateways, etc. Set of **Palestine,** set of **Egypt** (large pictorial, King Fuad, etc.). Set of **Turkey** (including " Wolf " type). Set of **6 Algeria** (including 50c. and postage due). **Mesopotamia** (large pictorial). **Syria** (pictorial). **HEJAZ** (Mecca) a quaint looking stamp usually sold at 3d. Set of **4 Persia** (obsolete), **Levant** (unused). **Set of 8 Tunis** (new issue, pictorials, postage due, etc.). **Price 4½d.** only, postage 1½d. extra (abroad 2½d. extra.). **Purchasers** of the above packet asking for approval sheets will be presented with a unique set of **10 PICTORIAL MOROCCO,** including Air post. This *fine* set is usually sold at a 1/-. Satisfaction guaranteed or money returned. Senders of addresses of stamp collecting friends will receive another set in addition **FREE.**

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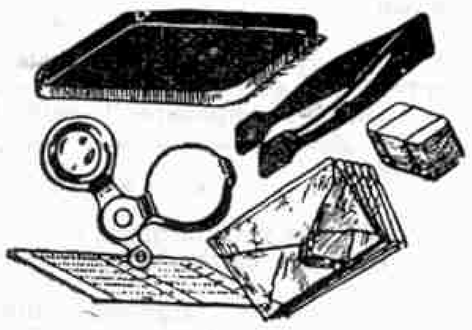
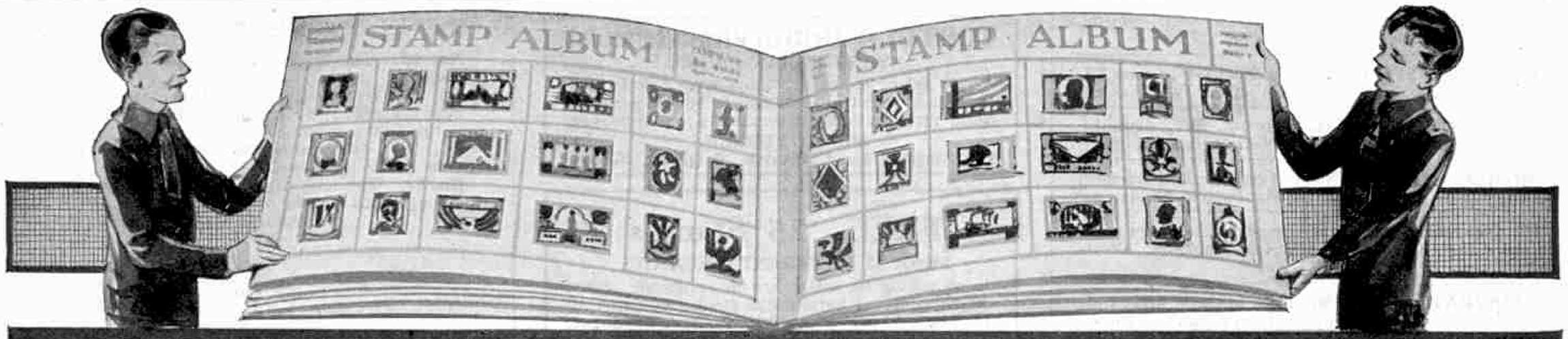




STAMP COLLECTING

THE STORY OF THE POSTMARK

ALTHOUGH, quite naturally, it is the ambition of every stamp collector to have his collection consist of nothing but clean specimens, personally we feel that the man who insists on mounting only unused specimens in his album is missing one of the best features of our hobby. Used copies not only possess the sentimental value of a duty done, but have a world of interest in their cancelling postmarks.

Probably few of our readers have ever given postmarks more than a passing thought; yet some of the most interesting stories of philately are linked up with them. The change of the colour of the first English penny stamps from black to red, was decided upon solely because of the importance of securing a legible postmark!

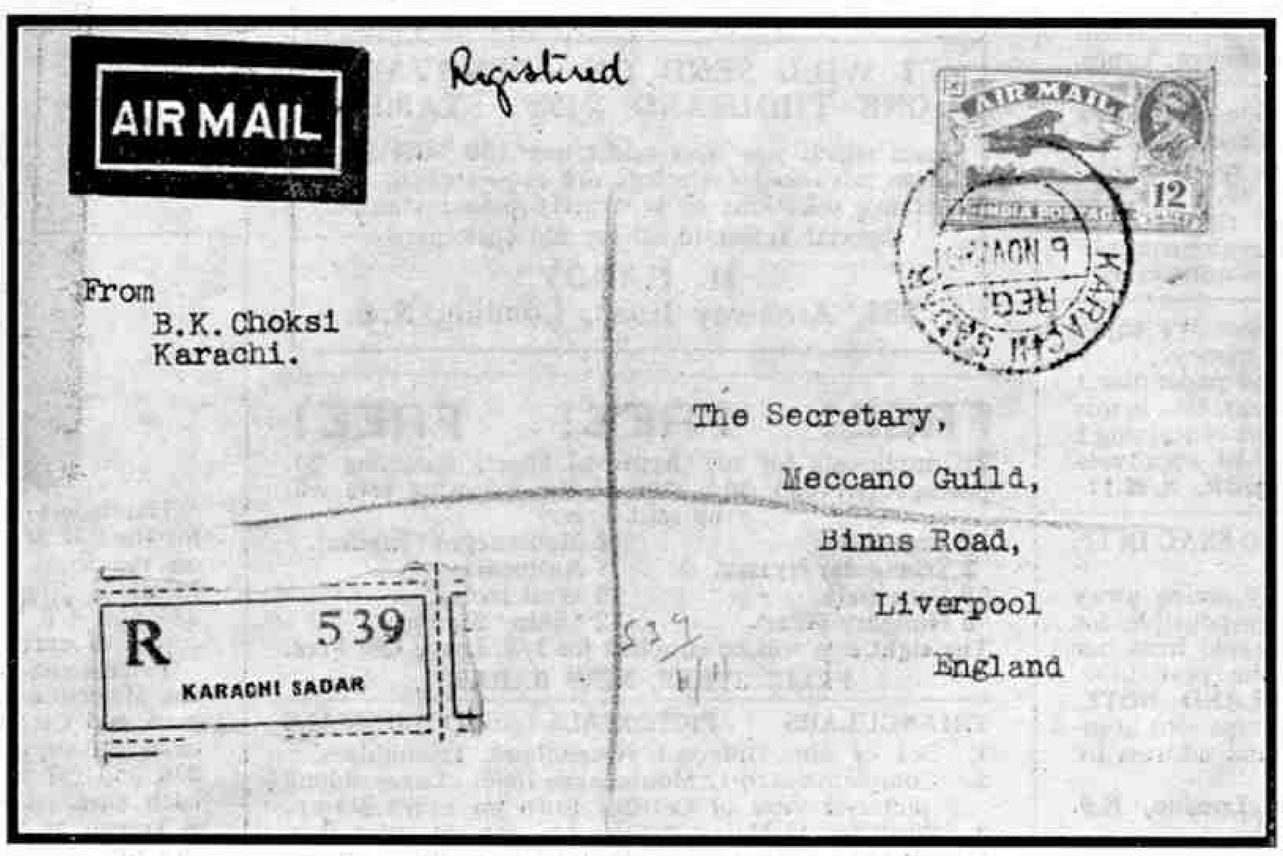
Sir Rowland Hill, the pioneer of cheap postage, who was Postmaster-General at the time, found by experiment that the red and other coloured postmarks first in use could be cleaned from the stamps without difficulty, and that only black ink gave a satisfactory permanent obliteration. Instructions were given that only black ink was to be used, but, of course, black postmarks were almost imperceptible on black stamps. In 1841, therefore, it was decided to reverse the early colours and to use red, the more fugitive colour, for the stamps themselves, and black for securing the desired legible permanent obliterations. Thus came the penny reds of 1841. They were destined to be a big family and to enjoy a long life, and actually, in their 40 years of existence, no less than 20,699,858,040 were sold!

Many of our readers doubtless are familiar with the story that patriotic boys at Eton stoutly refused to use the new Queen's head stamps when cheap postage was first introduced. They declared it savoured of treason to be a party to the deliberate defacement of the portrait of Her Majesty the Queen!

A similar objection was raised by the Sicilian Monarch, Ferdinand II, when, after holding out against cheap postage for many years, he was obliged by pressure of public opinion to follow the example of almost every other civilised country in the world. Ferdinand was a man of great self-esteem, and having agreed to the introduction of stamps, he meant the stamps to be in keeping with his dignity. He banned red and green colours; they were the Italian national colours and the King abhorred anything Italian. He was obliged to compromise when it was pointed out that the banned colours were the most suitable for stamp printing, but he saved his face by sanctioning only the use of shades that were dissimilar from the Italian colours!

The comedy continued with the King's objection to the use of an obliterator for used stamps! In no circumstances would he have his face blacked! In fact, anyone found attempting anything of that nature was to be charged with high treason and sentenced to a lingering death! But the King climbed down when he learnt that if the stamps were not obliterated the Royal revenues would suffer, and finally gave way when his advisers agreed to use a postmark that actually framed his portrait when carefully adjusted on the stamp! But woe betide the careless postal employee who dared to hang a frame around the Royal neck! This Gilbertian episode throws an amusing light upon the early attitude toward the humble postmark.

In the early days of British postal history a Maltese-cross-like device, known as the cross paté, was employed as the obliterating postmark, but the similarity of the mark used in the various post offices throughout the British Isles rendered it impossible to say where a letter had been posted in the event of the date stamp being illegible, and it was decided to adopt numbered obliterators for all the more important post towns. These were introduced on 1st May, 1844. A number was allotted to each of the principal post offices. These were distributed in alphabetical order, gaps being allowed between the numbers to provide for sub-offices that were sufficiently important to require the use of such a stamp.



By courtesy of Mr. B. K. Choksi, of Karachi, we are able to illustrate this month an air mail cover bearing a specimen of the newly issued Indian air mail stamps. The design, it will be noted, features the D.H. "Hercules" machines that are used on the London-India air route, and the same design is used for each stamp in the set.

In the 1844 key list of obliterating numbers, provision was made for all such offices, but the fact that certain Scottish offices were still using cross patés in the autumn of 1845 seems to show that some considerable time was taken to issue the new markers. It is of interest to observe also that the 1844 list was almost identical with the 1837 list, a fact that aroused considerable comment on the ground that postal development was undesirably slow. This criticism obviously had been intelligently anticipated by the postal officials, for in evidence given in 1843 before a Committee set up to enquire into the administration of the postal services, it was stated that a rule had just been introduced whereby State-maintained post offices were to be established for all villages that received more than 100 letters per week! That is a very interesting sidelight on the extent to which letter writing was employed in early days.

About this time the carrying of the mails was being transferred from stage coaches to railways. Consequently many of the previously important offices became comparatively obscure, and their marks are exceedingly rare. The reason for this obscurity was that many of the post "towns" were not towns at all, but merely inns at which the coaches stopped to exchange horses or mails.

In the key list of 1844 the number of post offices using postmarks was given as 936, although, of course, the numbers did not run through to that figure, each number employed being preceded by a class letter, *A*, *B*, *C*, etc. Numbers were added up to November, 1873, at which point *G35* was reached, (*Continued on page 75*)

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2 Triangular Nyassa.	**5 Antioquia.**
10 Venezuela.	**15 West Indies.**
8 Hungary (War).	**12 'Ship' Stamps.**

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Answers to Christmas Puzzles—(*Continued from page 32*)

No. 29. The engine represented is Stephenson's "*Rocket.*"

No. 30. By changing the initial letter of the word "Bear" successively becomes "Pear" and "Tear," and this is the solution.

No. 31. The answer to the question asked in rhyme is "Wholesome."

No. 32. The long division sum represented in this very ingenious puzzle is as follows :—

```
30)60150(2005
   60
   ---
   ..150
    150
    ---
    ...
    ---
```

No. 33. The final appearance of the table was that shown in Fig. 33.

No. 24. The four clues given should readily enable readers to realise that the solution to this puzzle is "Camomile."

BINDING THE "M.M."

There are two methods of binding the "*M.M.*" to preserve back copies from the destruction that inevitably will be theirs should they be handled for any lengthy period without protection. First there is the spring-back binder system, that permits the copies to be inserted or removed from the binding case at will. This is intended primarily as a temporary arrangement for the protection of copies during the currency of their volume.

Handsome spring-back cases specially prepared for the "*M.M.*," with the name blocked in gold letters on the front cover, can be obtained from Meccano Limited, Binns Road, Old Swan, Liverpool, price 3/- and 4/6 for sizes large enough to hold 6 and 12 copies of current issues respectively.

Permanent binding cases for back numbers of the Magazine can be supplied by Messrs. O. H. Bateman and Co., 23, Hanover Street, Liverpool. These cases are supplied in two sizes (1) for six copies, price 3/6 and (2) for twelve copies, price 5/3 post free in each case. The binding cases are supplied in what is known as "Quarter Basil, full cloth"—that is to say three-quarters of the sides are dark crimson cloth and the back and a quarter of the sides are dark crimson leather as shown above. The case is tastefully embossed in gold with the name "Meccano Magazine," and on the back is the name and volume number.

Binding Six or Twelve Copies

These binding cases are supplied so that readers may have their Magazines bound locally, but where desired, the firm mentioned above will bind Meccano Magazines at a charge of 6/6 for six issues or 8/6 for twelve issues, including the cost of the binding and also return carriage. The covers of the Magazines may be included or omitted as required, but in the absence of any instructions to the contrary they will be included.

Whilst the binding of the twelve Magazines is quite satisfactory, they form a rather bulky volume and for that reason arrangements have been made to bind six months' Magazines where so desired, as explained above. Back numbers for any volume can be bound and the case will be embossed with the volume number.

Readers desiring to have their Magazines bound need only make a strong parcel of them, include a note of their name and address together with the necessary remittance, and send the parcel direct to Messrs. O. H. Bateman and Co., carriage paid.

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H. C. WATKINS, M. Dept., Granville Road, BARNET.

Stamp Collecting—(*Continued from page 73*)

this office being Lesbury, Northumberland. Then it was decided to fill in all vacant numbers, a process that took nearly nine years, and it was not until April, 1882, that *G35* was allotted to Bloxwich, Staffordshire. A complete list of the numbers, and the offices by which they were used, can be found in Mr. C. F. Dendy Marshall's "The British Post Office," published by the Oxford University Press.

In certain interesting cases postmarks also are indicators of the actual face value of the stamp. Well-known examples of this are to be found among the early Mauritius issues. In order to save expense, one plate only was engraved for the Colony, bearing the name of the Colony, the figure of Britannia, and no value tablet. It was the custom to print supplies in different colours and leave it to the postal authorities in the Colony to assign values as they pleased. Magenta was one of the colours employed and when it first appeared in 1859 it represented the 9d. value, but when supplies of the penny denominations ran short in 1862, this same magenta stamp was actually issued as a makeshift! In most cases, however, it is possible to tell for which value the stamp did duty, for a new postmark differing completely from those in use previously had been introduced in 1862.

In other cases postmarks show that stamps have been used in countries remote from those for which they were originally issued. Instances of this practice may be found frequently among early British issues when the less important British possessions and the Consular offices abroad were supplied with English stamps. The numbered obliterators employed give clear evidence of the corner of the world in which these stamps were used. Thus, *M* and *A25* were used in Malta; *G* and *A26* were used in Gibraltar; Constantinople used *C*, while Port Said had *BO2*, and so on. A complete list of these Overseas postmarks can be found in Gibbons' Catalogue, at the end of the section devoted to the stamps of Great Britain. To-day it is customary to overprint general issues in order to indicate where it is intended to use them, but occasional instances of use elsewhere crop up. Only a few days ago we received a letter from Canton bearing a French Indo-China stamp overprinted for use by the French Consular Office in Hong Kong. Other stamps on the envelope bore the Canton marking.

Postmarks serve also the purpose of enabling collectors to determine the earliest dates upon which particular varieties of long-lived issues appeared; and postmarks that definitely place a stamp as one of the earliest issues of its variety, therefore, materially increase the interest and value of the stamp. Our reproduction of the recently issued Western Australian Centenary commemorative illustrates this point, for it is a used specimen bearing the postmark of the day on which the stamp was first issued. Similarly, the postmark on the air mail cover illustrated here shows that the stamp, a specimen of the new Indian air mail stamps, was used in the first available mail following its issue.

In a short article it is impossible to do more than touch upon the fringe of the story of the postmark, but sufficient has been done to show how fascinating a subject it can be. Unfortunately, it will be difficult for any reader of limited means to endeavour to establish now a complete record of postal history on this side, but those who would like to take the subject up in a minor way would find a very interesting outlet for their enthusiasm in the collection of advertising slogan postmarks. In recent years our stamps have been defaced regularly with patriotic exhortations to "Buy Empire Goods," "Use Imperial Cables," "Post early for Xmas," and so on.

As far as can be traced the first use of a special Christmas "Postmark" was at Rochdale, Lancashire, in 1907. Mail for delivery on Christmas Day was required to be handed over the counter of a post office—not posted in a pillar box—prior to noon on 22nd December, and such packets were specially postmarked, "Posted in advance for delivery on Christmas Day."

In later years the idea was extended in various ways, other marks and other

(*Continued at foot of third column*)

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Stamp Gossip

Western Australian Commemoratives

We illustrate this month a specimen of Australia's new stamp which was issued on 28th September last, to commemorate the centenary of the foundation of Western Australia. Let us at once offer congratulations to the Commonwealth upon a successful design that deserves to rank with the best of recent British Colonials, and which is an even better effort than the Canberra commemorative.

Not the least pleasing feature of the design is the introduction of Western Australia's famous Swan, as the centre-piece. The use of the Swan was, of course, almost inevitable for the bird figured on all Western Australian stamps up to the shilling values from the earliest issues until 1913, when the Commonwealth issues superseded the individual issues of the five Australian states.

We take this opportunity of thanking the many Australian correspondents who were kind enough to send along specimens.

Air Mail Notes

Following the considerable increase in the use of air mails for heavy postal packets, it is probable that the very near future will bring a number of new air mail issues, principally of higher denominations. Denmark is about to add two values, 50 ore grey, and 1 krone brown, to her existing series, while a United States correspondent tells us that the U.S. series will be extended to eight or 10 values early this year.

In the meantime India has issued a first air mail stamp, which we illustrate in this issue. France also is to issue her first air stamp shortly and we understand that, contrary to most recent French issues, it is to be a really handsome production. The design is to show a trans-Atlantic mail 'plane arriving at Marseilles. The face value will be 1 franc 50c.

Further Monte Cassino Issue

A further value, 10 l. + 2 l., has been added to the Monte Cassino commemorative set, issued by Italy and illustrated in last month's issue.

The design is a reproduction of a stained glass window showing St. Benedict, the founder of the monastery, preaching from the steps of his monastic throne. The inscriptions read: *Eius, in obitu nro præsentia muniamur*—May his presence fortify us at the hour of death; and *Ora et labora*—Work and pray.

(*Continued from previous column*)

towns being included, until 1909 when, without a word of explanation, the scheme was dropped. The well-known "Post early for Christmas" device was introduced in 1925 and is now employed internationally, with slight variations of wording and design. The Canadian 1929 pictorial mark, showing a postman in the guise of Santa Claus delivering Christmas gifts, is among the most interesting.

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Ships' Funnels

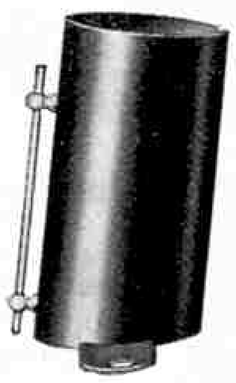
In the November "*M.M.*" we announced the introduction of 24 ships' funnels representing those of nearly all the principal Shipping Companies. Four of the new funnels were illustrated and described in page 888 of that issue.

Details of a further group, composed of seven funnels, are given below. In some cases the funnels represent more than one shipping line and we have indicated the names of these.

The Meccano Ships' Funnels are raked and are provided with two perforated lugs by means of which they may be bolted to any Meccano Strip or Plate. They are all beautifully enamelled and finished.

Price 9d. each

No. 138e
Pacific & Orient Steam Navigation Co. Ltd.



Black funnel

Also representative of the following:

Anchor Line Ltd.
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Denaby Shipping Co.
Donald & Taylor.
Duncan, J. T. & Co.
Dundalk & Newry, S.P. Co. Ltd.
Dunlop, Thos. & Sons.
Eastern & Australian S.S. Co.
Essex Line Ltd.
General Steam Nav. Co. Ltd.
Gibson-Rankine Line.
Glover Bros.
Henderson, P. & Co.
Hudson, R. N. & Son Ltd.
Hutchison, J. & P. Ltd.
Joplin & Hull.
Kyle Transport Co. Ltd.
Miller, Wm. S. & Co.
Mogul Line.
Morgan & Cadogan Ltd.
Murphy, Michael Ltd.
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Stott, W. H. & Co. Ltd.
Summerfield Steamship Co. Ltd.
Watts, Watts & Co.
Welsford, J. H. & Co. Ltd.
Woods, Tyler & Brown.

No. 138z
British & Irish S.P. Co. Ltd.
Green Funnel. Broad black band at top.

No. 138r
Brussels S.S. Co.
Yellow funnel. Black band at top with red and green bands round middle.

No. 138u
Yeoward Line.
Black funnel. Yellow band above middle flanked by two red bands.

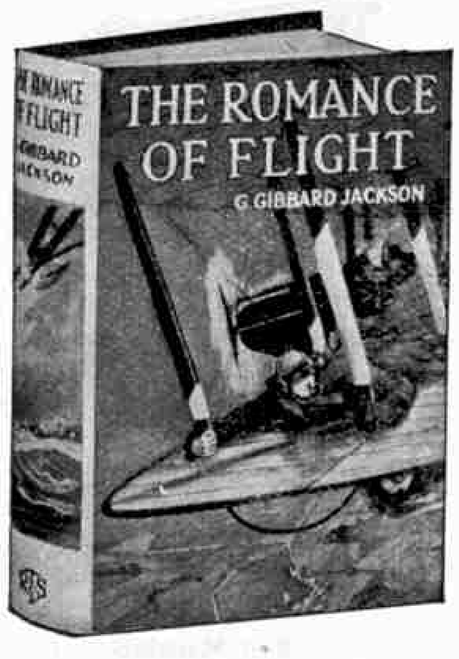
No. 138k
Lamport & Holt Line.
Blue funnel. Broad black band at top with broad white band immediately beneath.
Also representative of Jas. Cormack & Co.

No. 138q
Clan Line.
Black funnel with two red bands above middle.
Also representative of W. R. Davies Steamers.

No. 138f
Alfred Holt & Co.
Blue funnel. Broad black band at top.
Also representative of G. T. Gillie & Co.

Meccano Funnels are obtainable from any Meccano dealer, price 9d., or direct from Meccano Ltd., Liverpool, price 10½d. post free.

MECCANO LTD., Old Swan, LIVERPOOL



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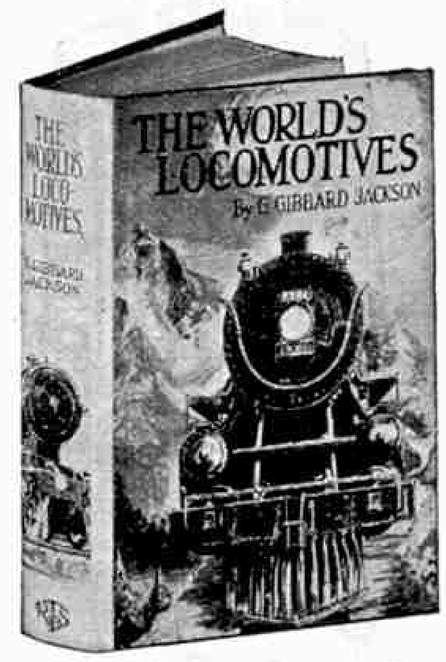

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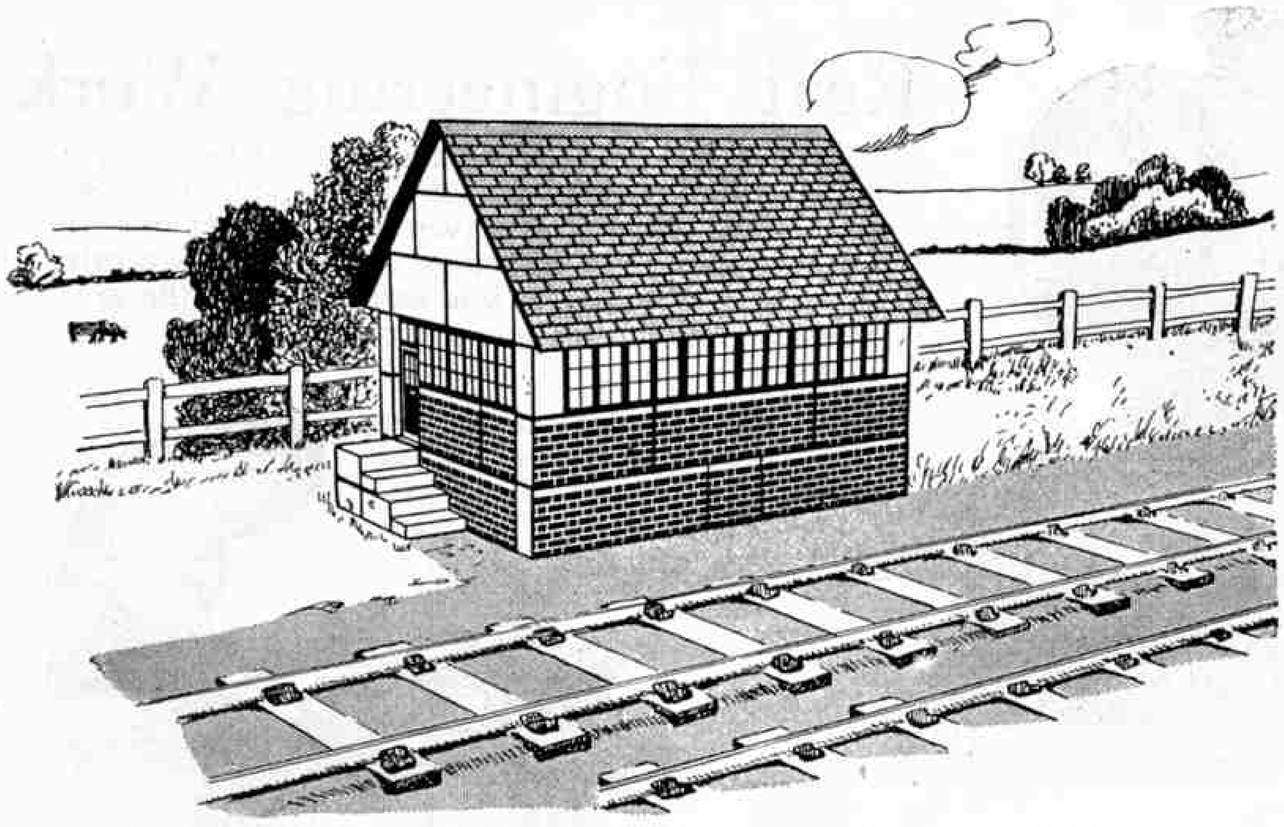

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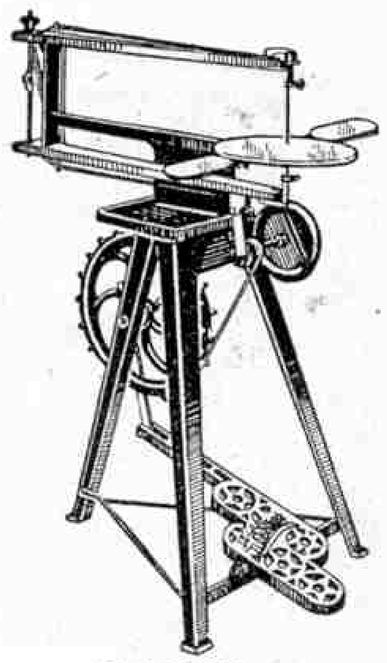

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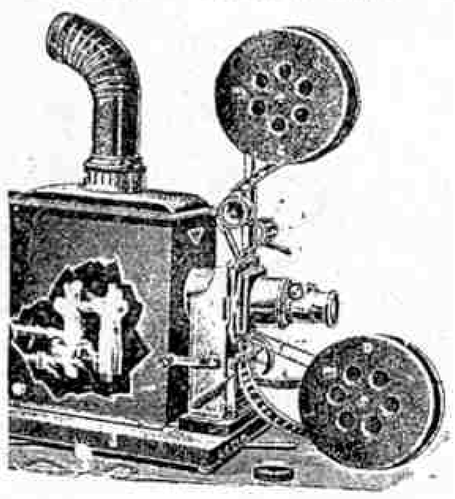

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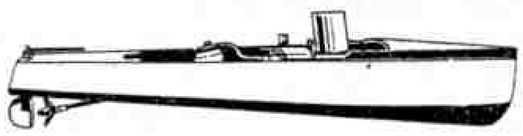

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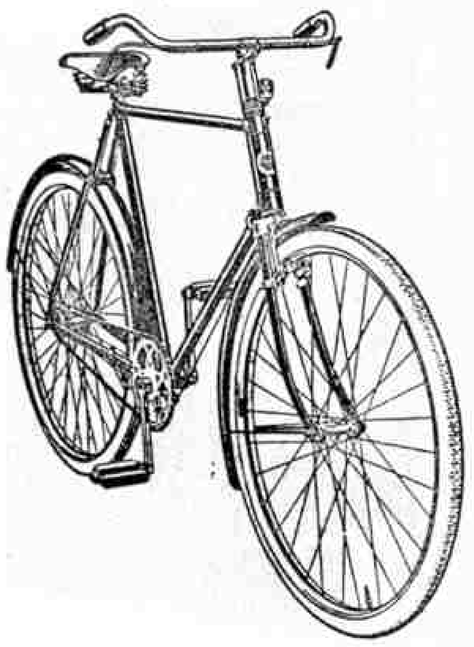

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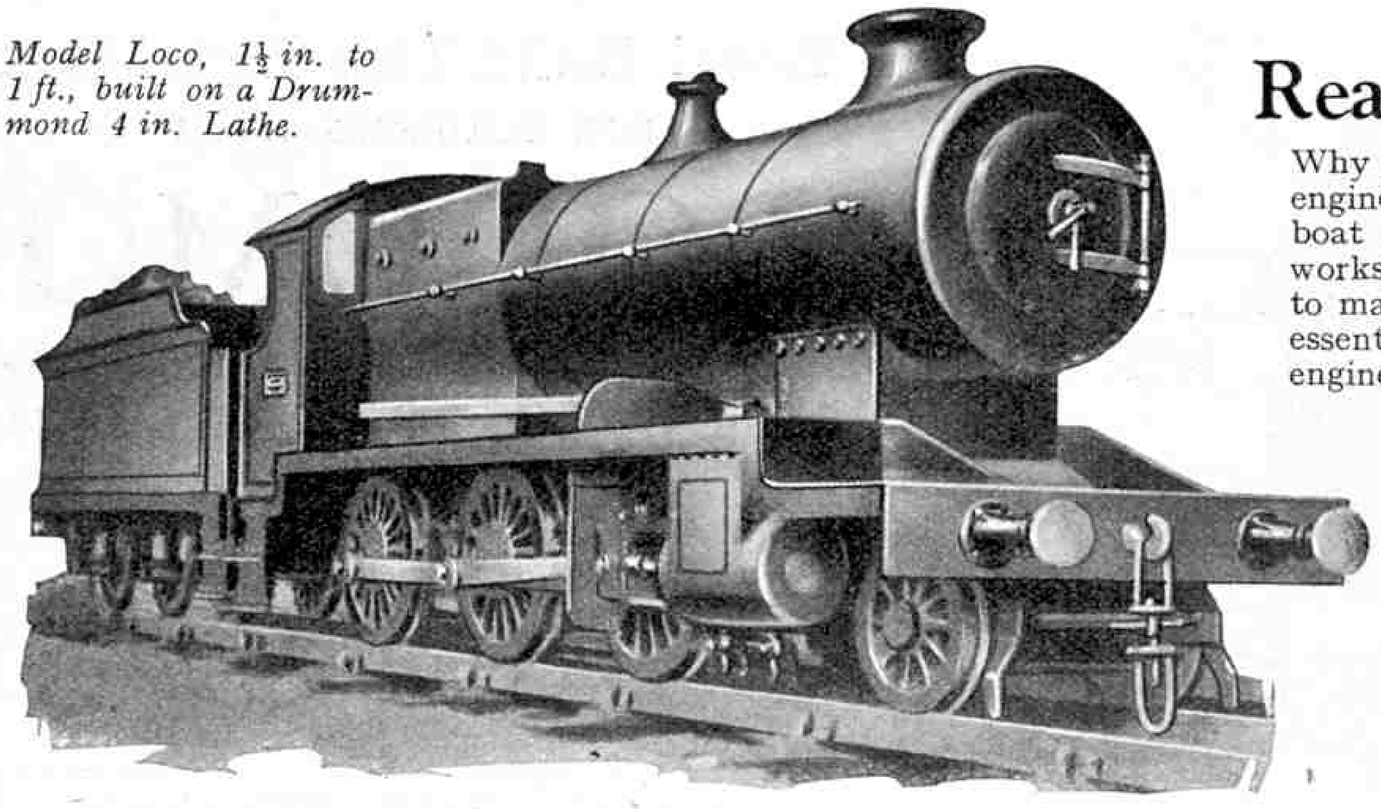

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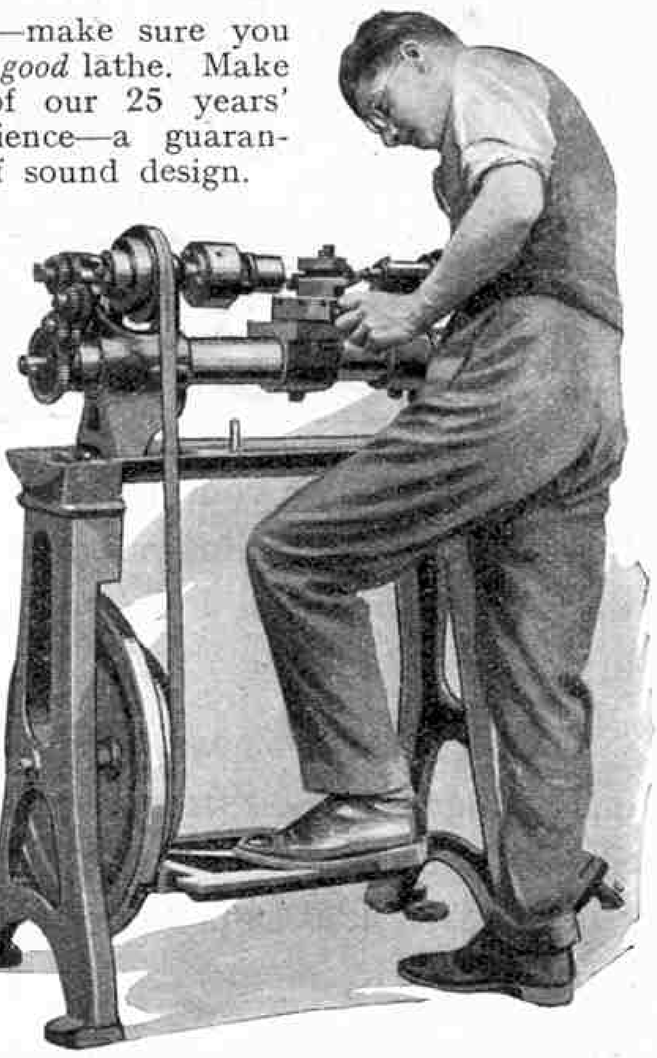

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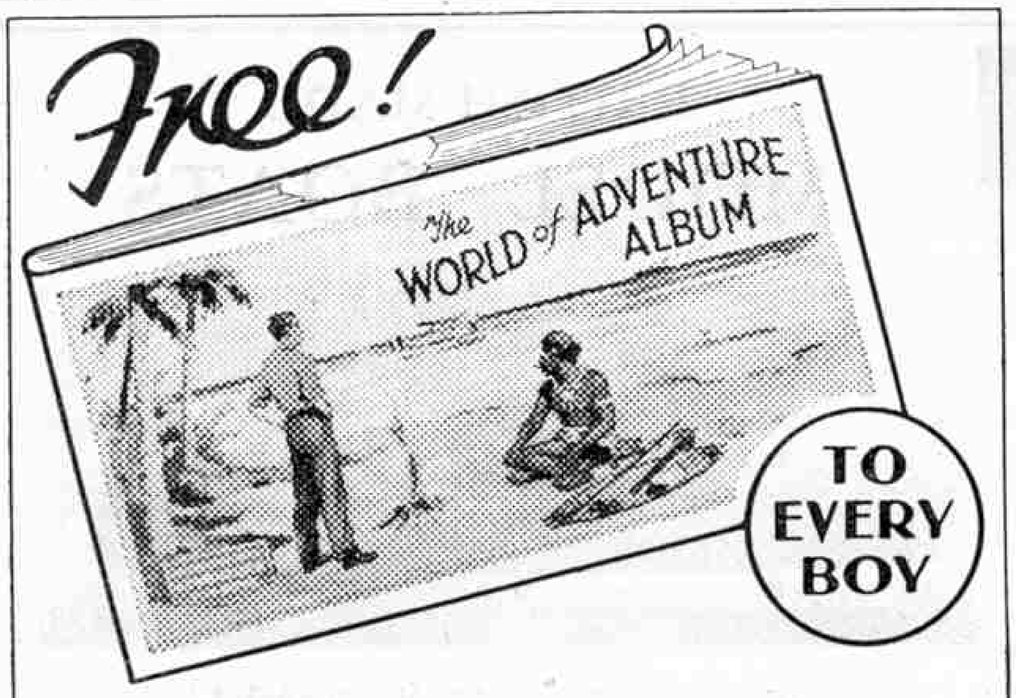

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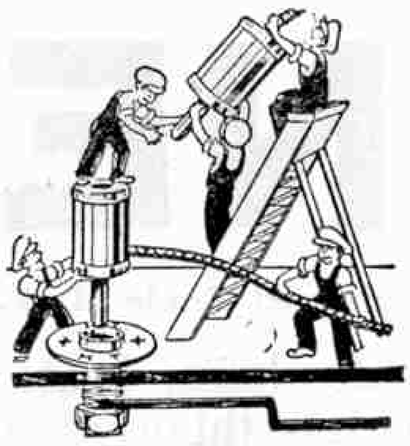

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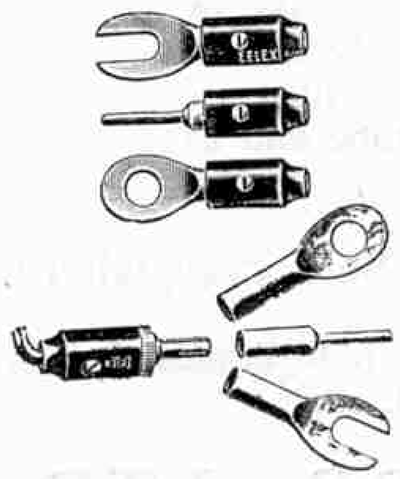

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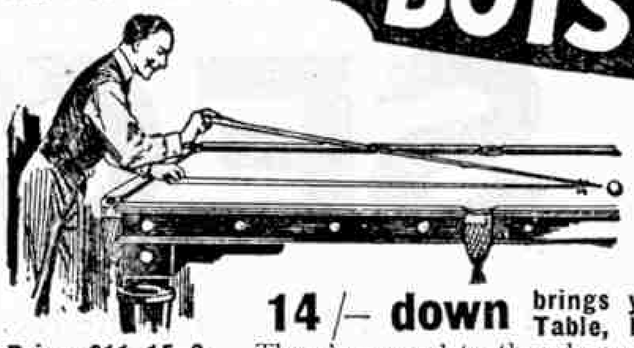

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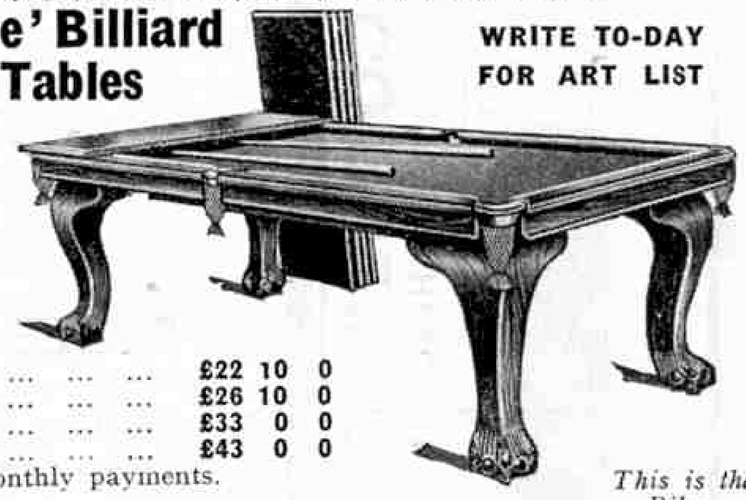

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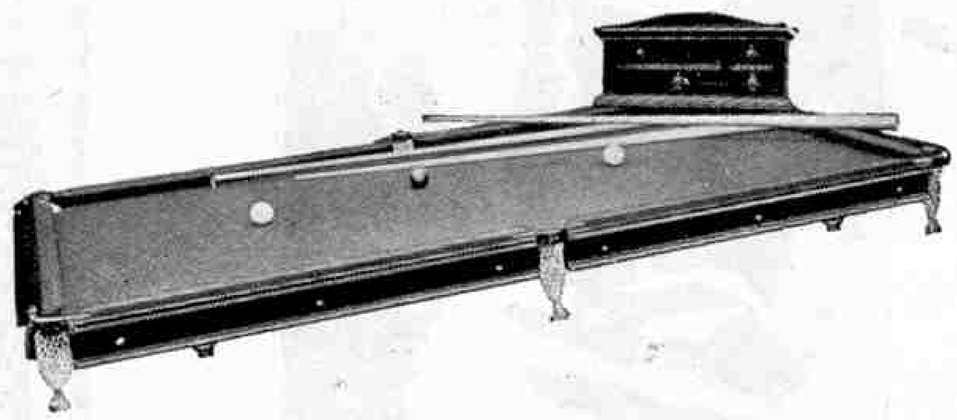

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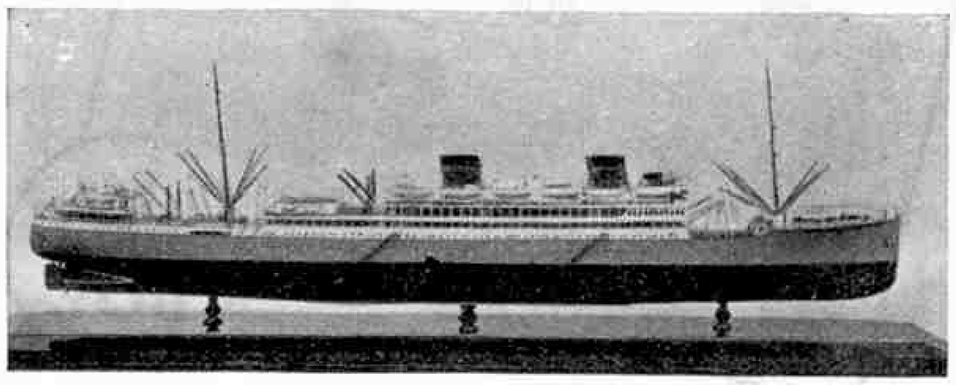

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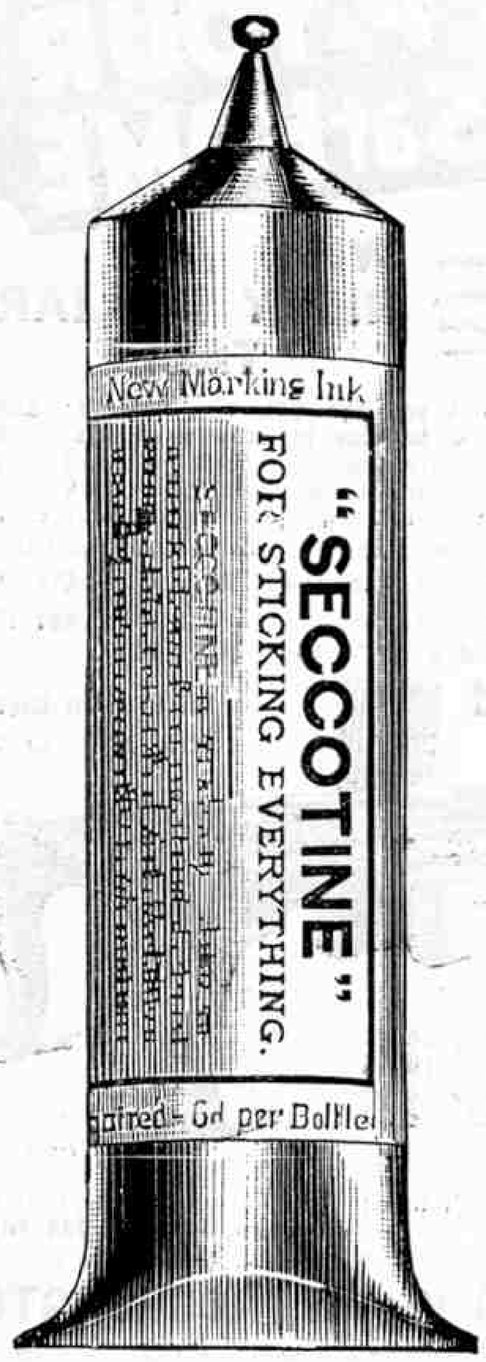

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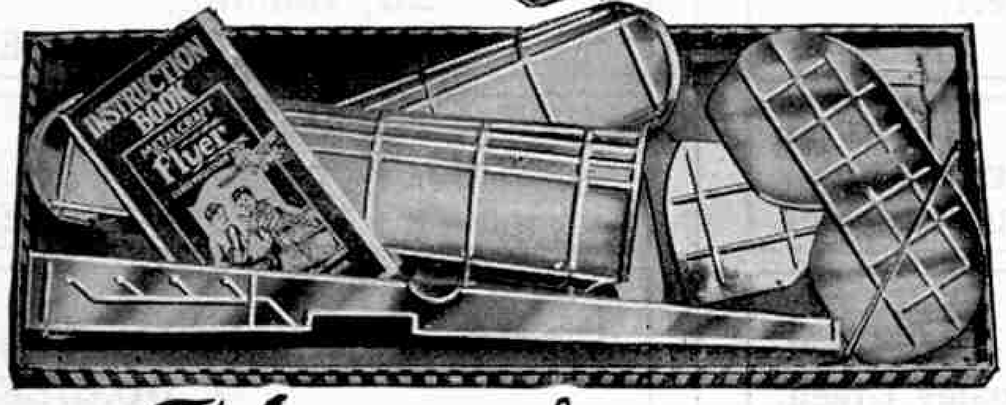

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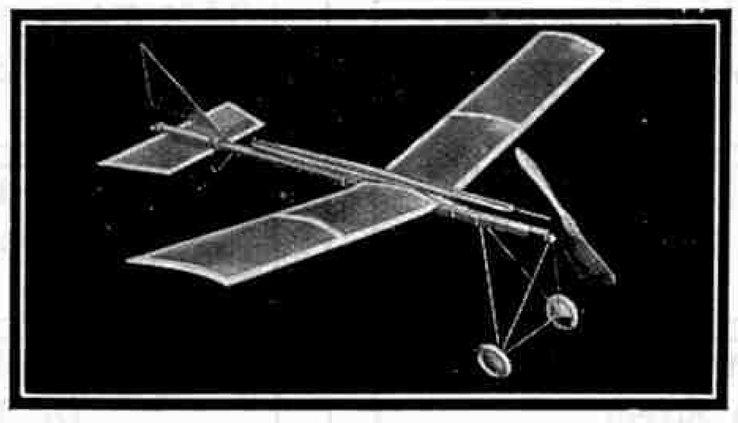

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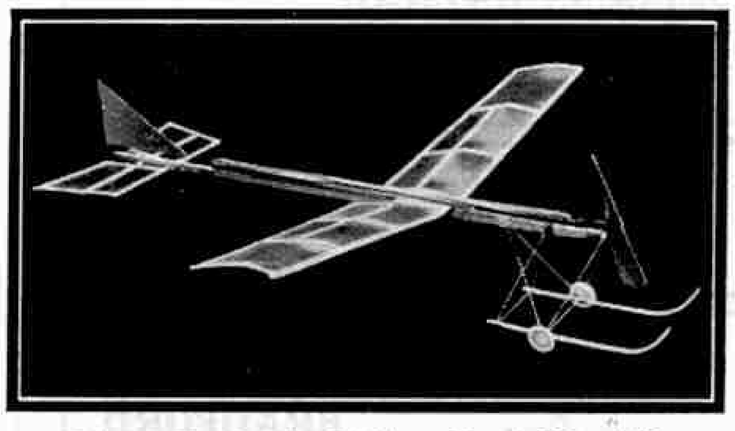

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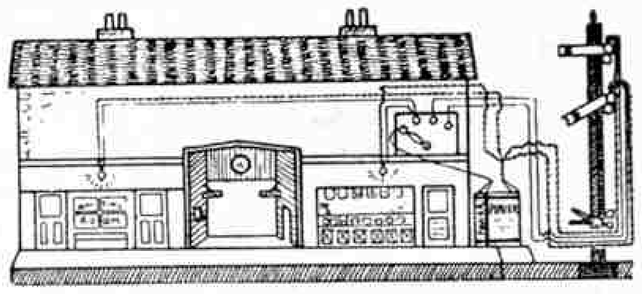

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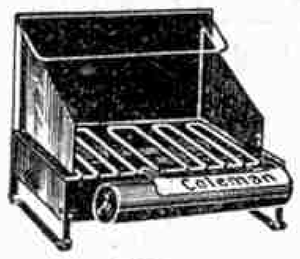

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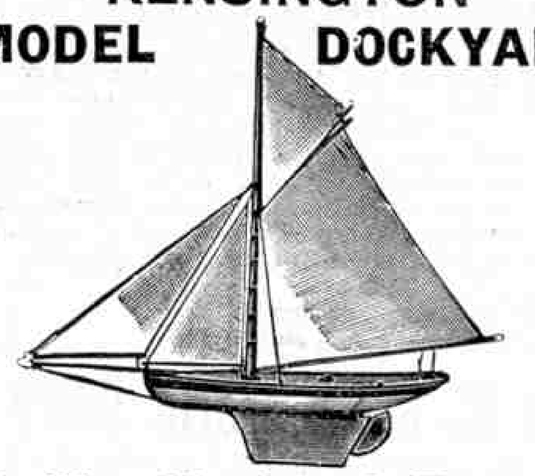

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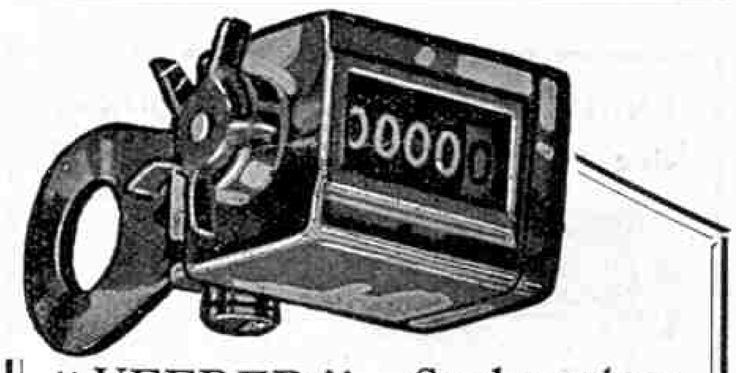

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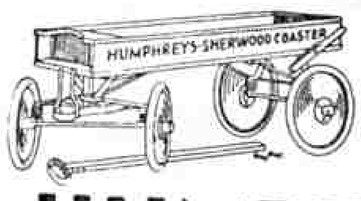

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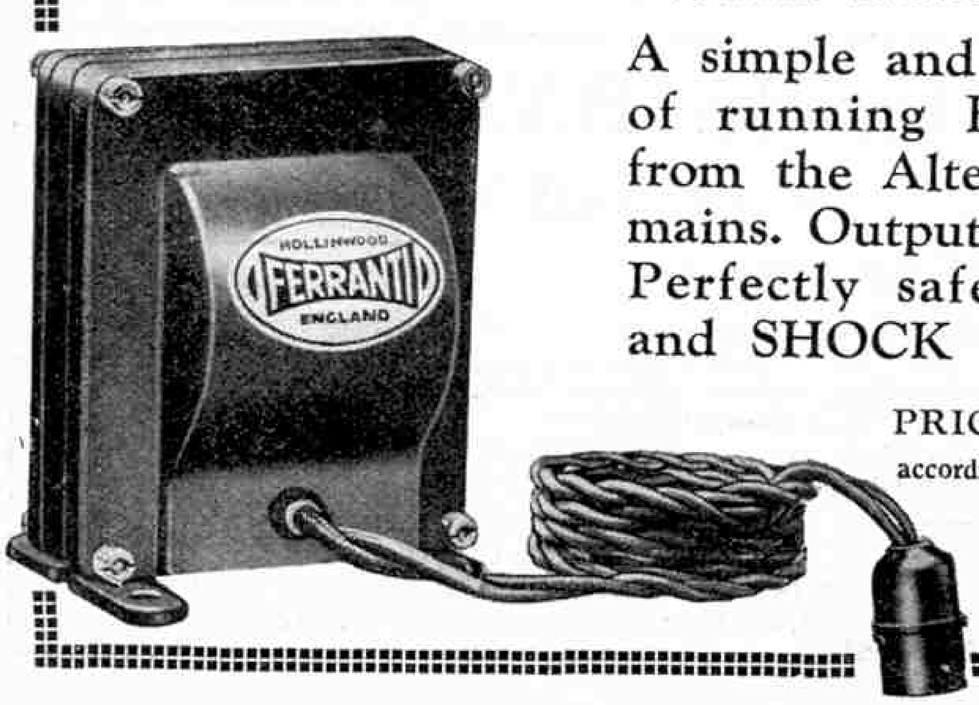

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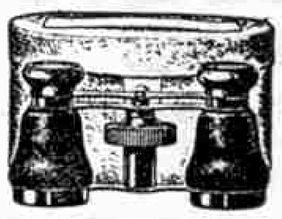

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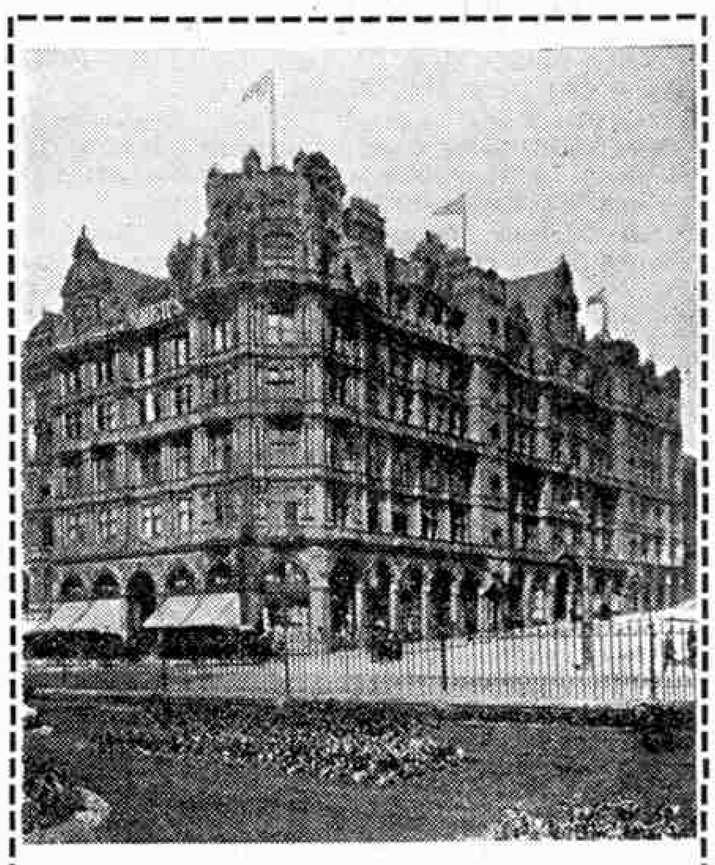

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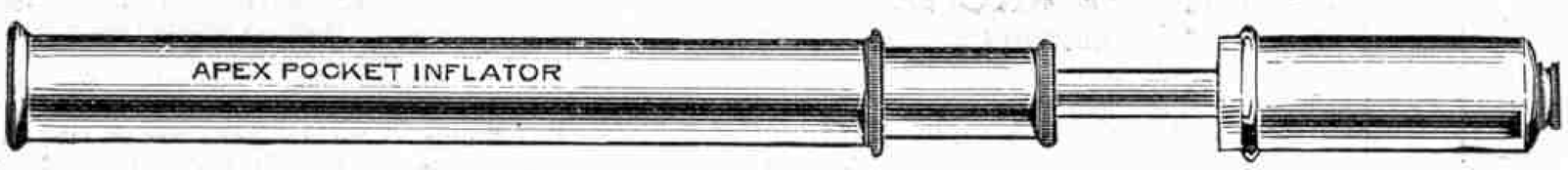

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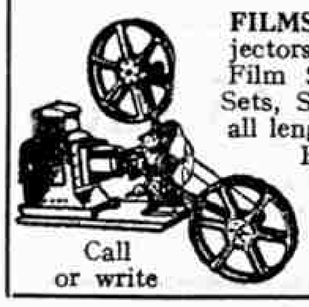

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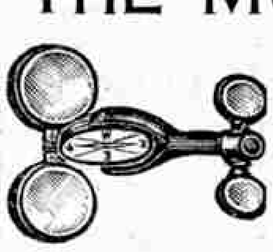

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EDITORIAL AND ADVERTISING OFFICES:—

OLD SWAN, LIVERPOOL, ENGLAND.

Telegrams: "Meccano, Liverpool."

Publication Date. The *"M.M."* is published on the 1st of each month and may be ordered from any Meccano dealer, or from any bookstall or newsagent, price 6d. per copy. It will be mailed direct from this office, 4/- for six issues and 8/- for twelve issues.

To Contributors. The Editor will consider articles and photographs of general interest and payment will be made for those published. Whilst every care will be taken of articles, etc., submitted, the Editor cannot accept responsibility for any loss or damage. A stamped addressed envelope of the requisite size should be sent where the contribution is to be returned if unacceptable.

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The Editor wishes to make known the fact that it is not necessary for any reader to pay more than the published price. Anyone who is being overcharged should lodge a complaint with the Meccano agent in his country or write direct to the Editor.

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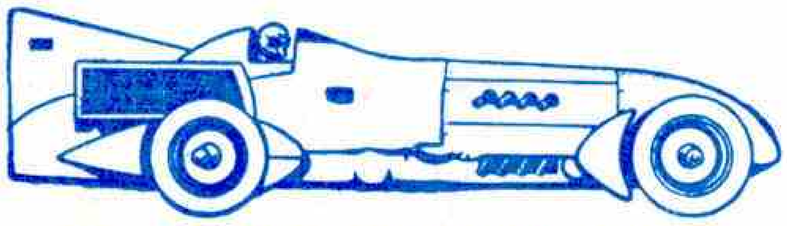

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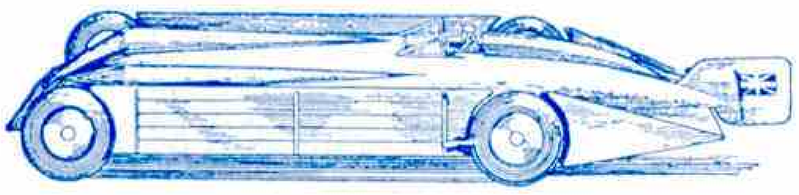

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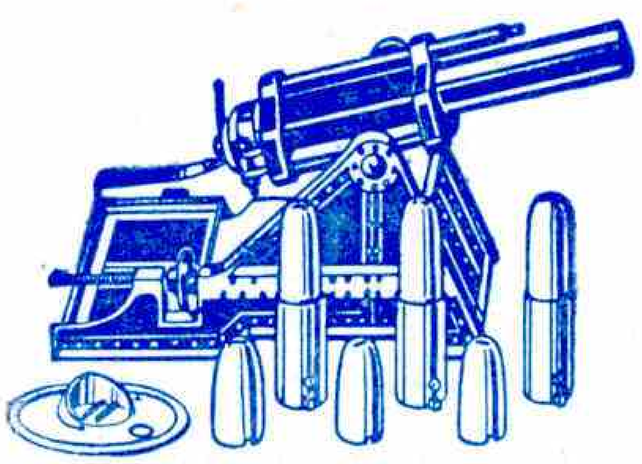

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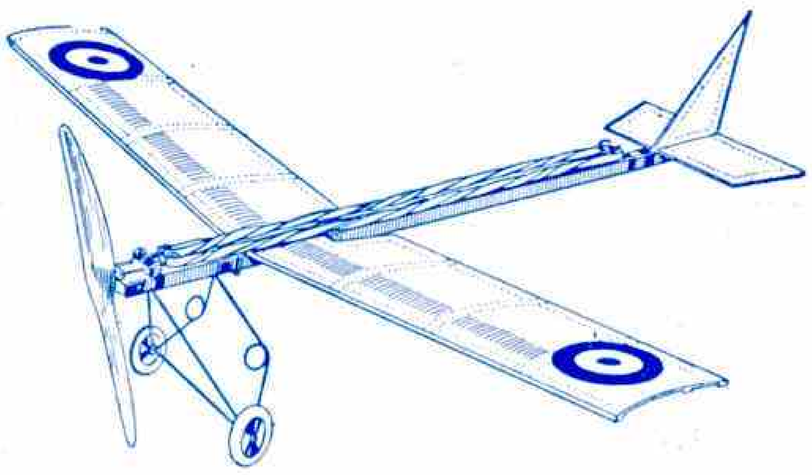

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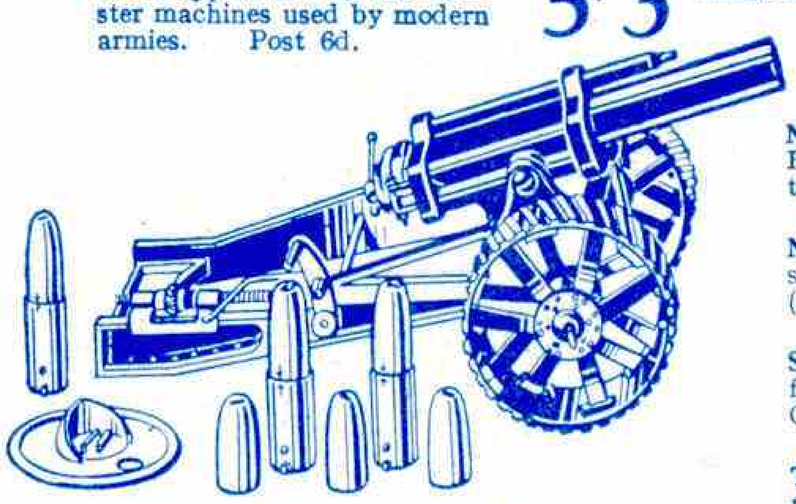

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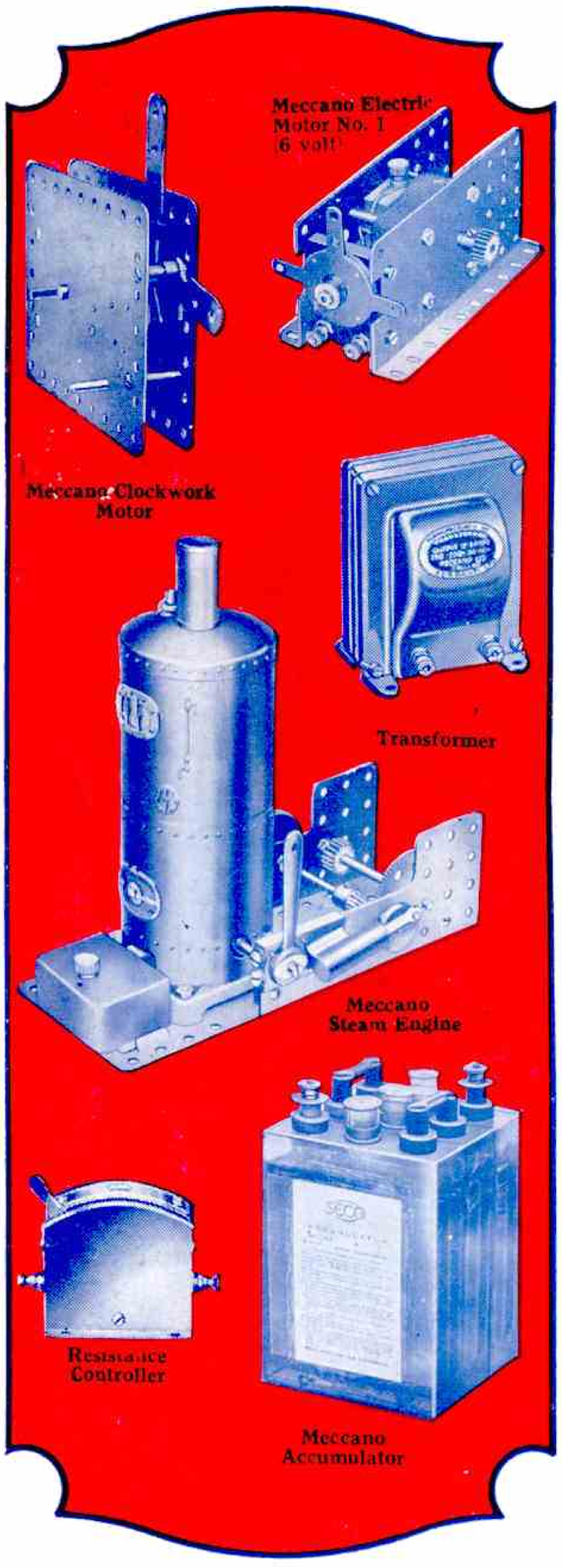

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